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THE STUDENT'S GUIDE

TO

MEDICAL DIAGNOSIS.

THE STUDENT'S GUIDE

TO

MEDICAL DIAGNOSIS.

BY

SAMUEL FENWICK, M.D., F.R.C.P.,
ASSISTANT PHYSICIAN TO THE LONDON HOSPITAL.

From the Third Revised and Enlarged English Edition.

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TO

DR. ANDREW CLARK, F.R.C.P.,

PHYSICIAN

TO THE LONDON HOSPITAL,

THIS VOLUME IS INSCRIBED,

BY

THE AUTHOR.

PREFACE TO THE THIRD EDITION.

ANOTHER edition of this work having been exhausted, the opportunity has been taken to make considerable changes in the present volume.

Greater attention has been bestowed on several of the subjects which students find more especially difficult. As the compulsory attendance on the classes of practical physiology has rendered medical students more familiar with the microscope, it has been thought advisable to amplify the descriptions of the minute changes that take place in the various organs in disease; the works of Rindfleisch and other recent authors on pathological histology have been chiefly followed.

Some of the woodcuts present in the previous editions have been withdrawn, and others have been substituted, which, it is hoped, will prove more useful. Most of the new engravings of the microscopic appearances in disease have been executed from preparations made by myself or by Mr. Needham, Assistant to the Lecturers on Physiology at the London Hospital. I have also to thank Mr. Needham for the drawings from which the woodcuts are engraved.

I am indebted to Dr. Hughlings Jackson for many valuable suggestions on the diagnosis of the diseases of the nervous system, and to Dr. Marston for his kind assistance in the revision of the whole volume.

29 HARLEY STREET, CAVENDISH SQUARE,
June, 1873.

PREFACE TO THE FIRST EDITION.

THE following pages were originally designed to assist the students attending the medical out-patient department of the London Hospital. The plan of instruction generally pursued there is to give to each pupil a succession of cases of a similar character. In this way, whilst one is practicing the laryngoscope, another is studying auscultation, a third affections of the nervous system, and so on. After examining a case, the student is expected to state his diagnosis, and the treatment he would adopt. Although this method of *individual* instruction is doubtless more beneficial than the practice of teaching in classes, yet it necessarily involves a constant repetition on the part of the teacher. To obviate the loss of time thus incurred, I commenced to write out some general rules for diagnosis, which the student might keep beside him as a guide in his examinations. It was afterwards suggested to me to elaborate the idea, and hence the appearance of the present volume.

As the pupils have been supposed not to have yet acquired any professional knowledge, except in anatomy and physiology, all technical words have been avoided as far as practicable, and the explanations have been given in the plainest language. Drawings and diagrams have been employed whenever the nature of the subject permitted their use.

It will be observed that I have confined myself to the general rules of diagnosis, and taken but little notice of the exceptions to them that are met with in practice. This has arisen, partly from a desire to keep the volume within a moderate compass, but mainly because exceptional, or as they are generally termed, "interesting cases," form the usual texts for clinical lectures, and are therefore less required by the student in an elementary work.

A number of subjects of interest have been omitted, such as the varieties of phthisis, &c. This has not arisen from any doubts as to the importance of these questions, but because it was not considered advisable to discuss, in a work of this kind, views which are not as yet generally admitted by clinical teachers.

In order to secure greater accuracy in the description of medical cases, various writers have recommended students to use outlines of the human body, so that they may mark upon them the parts at which the signs of disease are observed. For this purpose Figures 11 and 12 have been printed on a separate sheet, which is inclosed along with a piece of "carbon paper" in the cover of the book.[1]

I have to thank my colleagues, Dr. Hughlings Jackson and Dr. Morell Mackenzie, for many valuable suggestions in the chapters treating of the diseases of the brain and larynx, and Dr. Woodman, for much kind help; to Dr. Marston, Royal Artillery, I am especially indebted for the advice and assistance he has afforded me throughout the preparation of the work.

HARLEY STREET, CAVENDISH SQUARE,
October 1st, 1869.

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1 These outlines have been omitted in the present edition, as it was found more convenient for the student to use printed diagrams, which can be now readily obtained.

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GUIDE

TO

MEDICAL DIAGNOSIS.

CHAPTER I.

INTRODUCTION.

It is evident that before any one can successfully treat a disease he must be acquainted with its nature and the symptoms it produces. For instance, before prescribing for a patient suffering from pain in the head, you must ascertain from what the pain arises. It may result from the irritation of a decayed tooth, the extraction of which will give relief; or from inflammation of the periosteum, in which case you prescribe iodide of potassium with success; or from constipation of the bowels, for which a purgative only is required; or again, it may be symptomatic of an incurable disease of the brain, which might be aggravated by many of the remedies well fitted for the cure of a less formidable disorder. Diagnosis is the science which teaches us thus to distinguish one disease from another, and to trace symptoms to the causes from which they spring.

Now, diagnosis is not only valuable for treatment,

but it enables you to form an accurate opinion as to the future course of a disease. For example, two persons complain of palpitation of the heart; in the one, you may be able to prove that the organ is healthy in its structure, but excited by disordered digestion; in the other, you may find it affected with an incurable disease that may at any moment terminate the patient's life.

Before commencing to study the means of diagnosing the diseases of an organ, you should acquaint yourself with its healthy structure and with the various morbid conditions to which it is liable. You will not be able to understand why the chest gives a clear sound when struck with the fingers in a patient suffering from bronchitis, and a dull sound in a case of pneumonia, unless you know that the resonance of a healthy chest depends on the air contained in the cells of the lung, and that these cells are unaffected in bronchitis, but are filled with fluid or solid matters in pneumonia. Refresh your memory, therefore, as to the anatomy and physiology of each organ, and carefully read over the description of the different diseases to which it is liable, before you begin to learn how to diagnose them. You should also take every opportunity of comparing the remarks on morbid anatomy with the appearances presented to you at the post-mortem examinations, so as to make yourself familiar with the structural changes produced by disease.

Diseases are distinguished from each other, either by such alterations in the organs themselves, or their secretions, as can be ascertained by the senses of the observer (physical signs); or by changes in the functions of the parts affected (symptoms).

The physical signs of a disease are least liable to mislead us, inasmuch as in their employment we are independent of any misconception or exaggeration on the part of the patient. Thus, when we hear an abnormal sound in the region of the heart, or find the lung dull on percussion, or discover blood in the urine, we know there must be some abnormal condition of the heart, lung, or urinary organs. Great attention has been given of late years to this part of diagnosis, and various instruments have been invented—such as the stethoscope, laryngoscope, &c.—for the purpose of enabling us more accurately to appreciate the nature and extent of morbid changes. Care and patience are, however, required before you will be able to use these instruments with advantage, and I have therefore placed at the commencement of each chapter an account of the different methods of physical examination required, and a few directions as to the best mode of conducting them.

Physical signs cannot be exclusively relied upon for the formation of a diagnosis: the symptoms and history of the case must be also taken into consideration. It is generally difficult for the young student to guide the patient's account in such a way as to derive the necessary information from the details. Most persons ramble in describing their symptoms, and many insist on giving their own or other persons' opinions as to the nature of their disease, instead of confining themselves to the narration of facts. You will best overcome these difficulties by conducting your examination in a systematic manner, and by having a definite aim in every question you ask.

Students generally expect that some one sign or symptom is sufficient to indicate each disease, but, unfortunately, this is not the fact—we can generally only diag-

nose any morbid condition by taking into consideration a number of symptoms; indeed, we are sometimes forced to determine the nature of a malady by proving what it is not, rather than what it is. The plan of diagnosis adopted in the following pages has been to divide all the diseases of each organ into groups, by fixing upon some well-marked character which is possessed by some in common, but which is wanting in others; and in the same way to divide and subdivide each group. Thus, the diseases of the liver are first grouped into acute and chronic affections; the latter are again divided, according as the organ is enlarged or diminished in size; and the enlargements are further subdivided into those in which there is, and into those in which there is not, either pain or tenderness on pressure.

The art of diagnosis would be readily acquired, if the symptoms of each disease were in all cases the same, but this is not so. Although therefore the rules laid down will generally suffice, yet you will occasionally meet with cases in which the accustomed signs are absent, or in which unusual symptoms are present. For instance, no complaint has more strongly marked signs than peritonitis—the excessive and general pain of the abdomen, the great tenderness on pressure, the rapid, wiry pulse—and yet you may meet with fatal peritonitis with scarcely any pain, or without tenderness, or with a pulse not above the normal standard.

In order to obtain the necessary skill in diagnosis, it will be requisite that you should practice the "taking of cases." You should record the symptoms and physical signs present in each case, the order in which the symptoms have been developed, the treatment adopted, the progress of the disease, and, if it terminate fatally,

you should add the morbid appearances discovered after death. You will readily understand that unless some plan is adopted, there is a great probability that you will either incumber your description of the disease with a number of unnecessary details, or overlook important facts. I have therefore added the following suggestions for a plan, which you will find useful until experience enables you to form a better one.

Commence with the name and address of your patient, his age, and occupation.—The age is important, because many diseases, such as cancer, are chiefly found at certain periods of life. The nature of the occupation often gives a clue to the complaint; as, for instance, painters and other workers in lead are especially liable to colic and paralysis.

Note the position of the patient.—In pleurisy with effusion he usually rests on the affected side; he is propped up in bed in many diseases of the heart and lungs; he lies flat and helpless in fever, &c.

The condition of the body.—Emaciated, as in phthisis, œdematous in diseases of the heart, kidney, &c.

The state of the skin.—Yellow, as in jaundice, dry and harsh as in some diseases of the kidney, soft and perspiring in rheumatic fever, &c.

The features and expression.—Every feature may furnish important indications of disease. The arcus senilis often accompanies disease of the heart and arteries; the nostril is dilated where the breathing is difficult; the angle of the mouth drops in palsy, it is fixed in a rigid smile in tetanus.

Whilst noting the above or any other peculiarity, avoid all unnecessary staring at your patient; educate your eye to catch the smallest deviation from the nor-

mal condition, and, at the same time, try to put the patient at his ease so that he may be more ready and willing to answer your questions.

Next, inquire as to the manner in which the complaint commenced, whether suddenly or gradually; if it followed some other disease, such as scarlatina or rheumatic fever; or if it could be reasonably attributed to any particular cause, as exposure to cold, accidents, &c. Ascertain also if any of the patient's family have been subject to any particular malady, and if he generally enjoyed good health before his present illness.

The best way of commencing your inquiries as to the organ more especially affected, is to ask where the patient suffers pain. If, for example, he complains of the right side of the chest, you know the lung is situated in that part, and you inquire into the state of the functions of that organ, and ask if he suffers from cough, expectoration, dyspnœa, hæmoptysis, &c. Having determined which organ is diseased, ascertain the nature of the ailment by the rules laid down in the chapter referring to it, and note the symptoms and physical signs present in the case.

It is seldom that any organ remains long diseased without implicating others. You must therefore inquire into the manner in which the functions of all the chief organs are performed, paying more especial attention to those which are most liable to suffer along with that primarily or chiefly affected. Thus, if you should suspect a disease of the liver to be a lardaceous degeneration, you would particularly examine the state of the spleen and kidneys; or in a case of contracted kidney you would record the condition of the heart and retinæ.

In every case it is important that you should note the

state of the pulse, respiration, tongue, and appetite, together with the condition of the bowels and the amount and characters of the urine, and, if any fever exists, the temperature in the axilla.

Remember to commit all your observations to writing. A number of well-recorded cases is invaluable, and forms the best "practice of physic" for your future reference and guidance. Describe only what you see and hear, do it in the simplest language, and do not allow your expressions to be guided by any preconceived opinion as to the nature of the disease you are investigating. Be exact in your description of physical signs, and, as much as possible, employ your pencil in marking out on diagrams of the body the precise spots at which you discover signs of abnormal conditions. In this way, with ordinary industry in collecting cases of disease and perfect honesty in recording your observations, you cannot fail to surmount the difficulties of medical diagnosis.

As inflammation is the cause of so many of the morbid changes in every organ of the body, it will be necessary to make a few preliminary observations in order that you may understand the microscopical appearances of the parts affected by it. This process has been carefully studied with the microscope in the transparent parts of several of the lower animals: the wing of the bat, the mesentery, tongue, or web of the frog, being generally selected for this purpose.

As soon as inflammation has been set up, either by exposure to the air or the application of some irritating substance, the smaller arteries are seen to dilate, and the blood in them is observed to flow with increased speed.

The dilatation extends to the capillaries and veins of the affected part, and is at first accompanied by an acceleration in the rate of their contents. After a time the current of the blood gradually becomes slower, obstructions occur here and there, and, after many oscillations to and fro, its further progress through the affected vessels is completely arrested.

As soon as the circulation begins to slacken, an increase in the number of the white globules of the blood

FIG. 1.



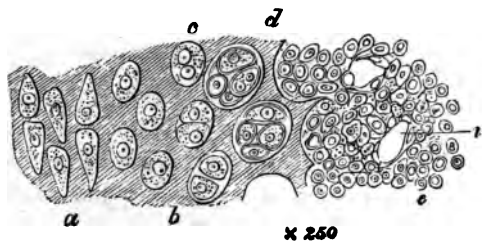
Production of stasis in inflammation. (WHARTON JONES.)

(leucocytes) is observed to take place. They collect at the sides of the dilated vessels, whilst the red globules are crowded together in the centre, and form a mass, in which their individual forms can no longer be recognized. The stasis of the red blood-cells usually first occurs at a bifurcation of a vessel. Thus, in Fig. 1, the blood-cells passing along the vessel C, strike against the wall of the capillary at its bifurcation, and block up the vessel at D. Finding their way through the communicating branch, a crowd of cells meet at B, from both F and C, and eventually block up the vessel, F G, also.

You will readily understand that the liquid part of the

blood (the liquor sanguinis), being subjected to the pressure of the heart behind at C and F, and arrested in its onward progress at D and G, will strain through the sides of the distended vessels, and thus, in part, produce the swelling which is so constant an accompaniment of inflammation. But the white globules of the blood have been also seen by the microscope to pass through the walls of the bloodvessels into the surrounding struc-

FIG. 2.



Microscopical appearances presented by cartilage when inflamed. *a*. Normal cartilage cells. *b*, *c*, *d*. Cartilage cells increasing by division. *e*, *i*. Groups of newly-formed cells. (CORNEIL and RANVIER.)

tures, where they travel from place to place, and, by their division, reproduce numerous other cells like themselves.

Some physiologists are inclined to refer all the newly-formed cells in the neighborhood of an inflamed part to the white globules of the blood, thus exuded and multiplied by self-division. Others, on the contrary, contend that the elements of the tissues themselves increase by division, and assist in the production of the pus-cells and other products of inflammation. This process is shown in Fig. 2, as it appears in inflamed cartilage.

CHAPTER II.

DISEASES OF THE HEART AND PERICARDIUM.

1. THE chief diseases of the heart are pericarditis, myocarditis, hydropericardium, hypertrophy, dilatation, fatty degeneration, endocarditis, and diseases of the valves.

2. PERICARDITIS, or inflammation of the pericardium.—When death occurs in the early stage the lining membrane is of a red color, it is rough, pulpy, dry, thickened, and is usually covered with a layer of lymph, which is often arranged in the form of little hillocks, or like the sand on the sea-shore, or it may be loose like thread. These appearances are produced by the motions of the heart continually separating the opposed surfaces of the serous membrane when coated with the soft lymph. At a later period the pericardium is distended with a turbid fluid, having flakes of lymph floating in it. In other cases the fluid is stained with blood, or mixed with pus. Sometimes there are also minute tubercles on the pericardium, when the disease is named *tubercular pericarditis.*

The first effects of pericarditis are to excite the action of the heart and to set up general fever. If the fluid effused be large in amount it lessens the power of the heart, and thus produces congestion of the lungs and other important organs. After the cessation of the inflammation we often find bands between the opposed surfaces of the pericardium, or its cavity is obliterated

by general adhesions. (For the microscopical appearances see Pleurisy.)

3. HYDROPERICARDIUM, or dropsy of the pericardium. Fluid of an amber color distends the cavity of the pericardium, without the lining membrane being thickened or inflamed. It chiefly arises from diseased heart or kidneys. The compression of the fluid when this is present to a large amount prevents the free action of the heart, and thus gives rise to congestion of the lungs and of the muscular structure of the heart.

4. HYPERTROPHY OF THE HEART.—The heart is of a globular shape, and is greatly increased in size; often double or treble the normal weight. The thickness of its walls is also much increased. When cut into the substance feels hard and stiff, and the walls do not collapse when the cavities are emptied of blood. Microscopically, unless fatty degeneration is present, the edges of the fibres are sharp and their transverse striæ well-defined, but the fibres do not appear to be thicker than in their normal condition.

There are three forms of hypertrophy—1. *Simple* hypertrophy, where the wall is thickened, but the cavity is not enlarged. 2. *Eccentric* hypertrophy, known also as *hypertrophy with dilatation*, where the wall is thickened and the cavity also enlarged. 3. *Concentric* hypertrophy, in which the wall is thickened and the cavity lessened. The second is much the most frequent; many deny the existence of the third form.

Hypertrophy is caused by any obstruction to the current of blood that is sufficient to call forth an increased action of the heart to overcome it, in other words, by overwork. Thus the right ventricle (see 3, Fig. 3) is chiefly affected in cases of emphysema, chronic bron-

chitis, and disease of the left side of the heart, which obstruct the free course of the blood through the lungs (6, Fig. 3); the left ventricle (see 1, Fig. 3) by an obstruction in the aorta (see 7, Fig. 3); the left auricle (2, Fig. 3) by a constriction of the mitral valve. The whole heart, or only one or more of its cavities, may be thickened; the left ventricle is most frequently affected. When the left ventricle is alone or chiefly hypertrophied the heart is elongaged; if the right ventricle is alone hypertrophied the apex is partly or wholly formed by it, and the organ assumes a square shape. The increased strength of the heart's action, when it is hypertrophied, tends to produce disease of the brain and other important organs.

5. DILATATION OF THE HEART.—The shape of the heart is more square than when healthy, and the capacity of one or more of its cavities is increased, so that the whole organ seems enlarged. Microscopically, the striæ of the fibres often appear indistinct and granular; in other cases they seem to be in a state of fatty degeneration. There are three forms of dilatation—1. *Simple dilatation*, when the cavity is enlarged but its wall is of normal thickness. 2. *Dilatation with hypertrophy*, when the cavity is enlarged and the muscle is thickened. 3. *Dilatation with thinning of the wall.*

Dilatation may be caused by any circumstance that prevents the complete emptying of one of the heart's cavities; thus it affects the left ventricle when an imperfect closure of the aortic valves allows the blood which had been just expelled to flow back again into that cavity: or it may be caused by loss of tone resulting from myocarditis or general debility, or from fatty or other degenerations of the muscular structure of the heart.

FIG. 3.



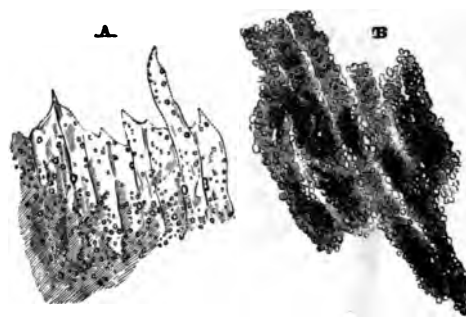
1. Left ventricle.
2. Left auricle.
3. Right ventricle.
4. Right auricle.
5. Pulmonary veins.
6. The lungs.
7. Aorta.
8. Brain and upper extremities.
9. Venæ cavæ.
10. Spleen.
11. Intestine.
12. Kidney.
13. Lower extremities.
14. Liver.

Diagram of the circulation. (DALTON.)

Dilatation usually involves both ventricles, but is most common in the right when one only is affected. The auricles generally participate in the increase in capacity. In consequence of the feeble contractions of the organ the lungs and liver are apt to be congested and dropsy is produced.

6. FATTY DEGENERATION.—The heart is of a pale yellow color, it feels soft, flabby, and greasy, and tears readily. Microscopically, the fibres have lost their sharp edges and striæ, and are more or less loaded with oil; in other cases the sarcolemma is filled with granular matters. (See Fig. 4.) Fatty degeneration occurs under four forms—1. Confined to the superficial layers of the muscle immediately below the pericardium, arising

FIG. 4.



Specimens of fatty degeneration of the heart. A. Heart fibres taken from the columnæ carneæ of the mitral valves. B. An extreme case of fatty degeneration, showing an entire conversion of the muscular fibre into oil molecules, still retaining a linear arrangement. (JONES and SIEVEKING.)

from pericarditis. 2. As white dots or marks, immediately below the endocardium, common in valvular and other cardiac diseases. 3. As a single, isolated part, usually in the wall of the left ventricle, resulting gener-

ally from imperfect nutrition consequent on an obstructed state of the coronary arteries by atheroma. 4. As a general affection of the whole organ, as in fever, cancer, or some other disease affecting the general nutrition of the body.

The left ventricle and the carneæ columnæ are most liable to fatty degeneration. This condition is chiefly found in persons of old or middle age, and is generally associated with other diseases of the heart and arteries. Its chief effect is to greatly diminish the energy of the heart's contraction, so that the brain and other organs are imperfectly supplied with blood; attacks of pseudo-apoplexy are often induced.

7. Fatty Infiltration must not be confounded with fatty degeneration. It is merely a form of local obesity, and consists in the accumulation of fat below the pericardium, and between the muscular fibres. The fibrils themselves appear healthy when viewed microscopically, and are capable of performing their functions during life.

8. Endocarditis, or inflammation of the endocardium.—In this disease the lining membrane of the heart is reddened, roughened with lymph, or the valves are opaque, thickened, or contracted. Projections like small warts, named vegetations, are often found in recent cases on the valves, being most thickly placed on the lines where the segments of the valves come into contact with each other during their closure. In other instances the segments of the valves are united together, or the chordæ tendineæ, or the valves, are softened and torn, or more rarely, ulceration of the endocardium or perforation of the valve takes place. The left side of the heart is almost always the seat of the disease, and

the mitral valve is more frequently affected than the aortic. In old persons the valves of the heart often become thickened, atrophied, contracted, or ossified from degeneration.

These various morbid changes in the valves either narrow the openings of the heart, and thus obstruct the free passage of blood through them, or they prevent the perfect closure of the valvular apparatus, and thereby allow a portion of the blood to flow back into the cavity from which it had been just expelled (regurgitation). In these ways any imperfection in a valve leads eventually to hypertrophy or dilatation of the heart.

9. MYOCARDITIS, or inflammation of the muscular substance of the heart, may occur as an idiopathic and general inflammation, or may be limited to the strata of muscular fibres, situated immediately below the pericardium or endocardium. The former is exceedingly rare, the latter more common, chiefly as an accompaniment of endopericarditis. The muscular structure is softened, and of a dark red color; in some cases it is hard and dense. Microscopically, the fibrils are seen to have lost their transverse striæ, and appear to consist chiefly of granular and fatty matters.

As inflammation diminishes the contractile power of a muscle, the action of the heart is weak and irregular in myocarditis, and the circulation of the blood is feebly carried on. It may terminate in abscess, or may give rise to dilatation of the heart.

10. CANCER OF THE HEART only occurs when other important organs are similarly affected, or as an extension of malignant disease of the pericardium or mediastinum.

11. TUBERCLE OF THE HEART is very rare, and

occurs chiefly in children along with general tuberculosis.

12. The blood occasionally coagulates in some part of the vascular system during life, most commonly in the veins or heart, just as it does when drawn from the body by venesection. Such a coagulum, which is termed a *thrombus*, may result either from a retardation in the blood-current, as in aneurism, or where the surface of the lining membrane with which it is in contact becomes roughened, as in endocarditis. A thrombus may either become organized, or it may soften. In the former case bloodvessels are developed in it, and it is eventually converted into connective tissue that firmly adheres to the vessel. Softening usually begins in the interior of the clot. This breaks up into a soft, pulpy mass that often presents the appearance of pus to the naked eye, but which, under the microscope, is seen to consist only of granular matter, fat-globules, and altered blood-cells. The most serious result of the softening of a thrombus is the detachment of portions of it by the force of the blood-current, and their subsequent arrest in some part of the vascular system. (See Emboli.)

13. Make yourself acquainted with the size and sounds of the healthy heart. You estimate the size of a heart by percussion. Let the patient lie upon his back, with the head slightly raised. Then tap lightly on the back of the forefinger of the left hand laid over the heart's region with the pulp of the forefinger of the right hand. If you percuss forcibly, you bring out the dulness where the heart is covered by the lung. Commence where the sound is dullest, and gradually proceed outwards, until the clear sound shows you that you have reached the edge of the lung. Mark the boundaries with

ink. You will find that the right boundary of the superficial dulness over a healthy heart is a vertical line through the middle of the sternum extending downwards from the level of the fourth costal cartilage. The left boundary extends in a waving line from the sternum, opposite the fourth costal cartilage, to the apex of the heart. The inferior boundary is on a line extending from the lower edge of the sternum along the sixth costal cartilage to the apex of the heart. Remark that the apex of a healthy heart beats between the fifth and sixth left ribs, or, in the male, one or two inches below, and to the right of the left nipple. In women the breast must be drawn aside whilst percussing.

14. There are two sounds of the heart. You hear the first most distinctly by placing your stethoscope over the apex; for the second listen at the middle of the sternum, just above the third costal cartilage. (The third costal cartilage is the most prominent one in the upper part of the chest.) The first sound is duller and longer than the second, and coincides with the impulse of the heart and is a little before the pulse at the wrist; the second coincides with the closure of the semilunar valves and the passive flow of the blood from the auricles into the ventricles. Ordinarily, the sounds are best explored when the patient is erect, but in cases of disease you may require to examine him in different positions—lying on the back, on the left side, leaning forward, &c. Sometimes you can best detect an alteration in the sounds by making him walk briskly up and down the room before you listen to the chest.

15. A word of advice as to the choice of a stethoscope may be here useful. The wooden stethoscope is best fitted for the ordinary examination of the heart. Before

buying one see that the ear-piece is sufficiently large, and accurately fits your *own* ear, and that the opposite end is of moderate size. The flexible stethoscope of Dr. Cammann, in which an ear-piece fits into each ear, can be used for the examination of the heart, but it is better fitted for auscultation of the lungs. The double or differential stethoscope of Dr. Scott Alison is exceedingly useful in many diseases of the lungs, and may be also employed with advantage in the diagnosis of valvular diseases. If, for instance, you wish to ascertain whether a murmur you hear originates in the mitral or the aortic valves, place one cup over the apex of the heart and the other on the sternum, just above the third costal cartilage. If the murmur originates in the mitral, the sound will be heard only, or most plainly, through the cup placed on the apex of the heart, but if it arises in the aortic valves, it will be most plainly audible through the other tube.

16. The state of the pulse affords the best indication of the manner in which the heart is performing its office. Never feel the pulse when you begin to speak to the patient, but wait until he has overcome any nervousness your visit may have excited. The application of a single finger to the artery is sufficient to enable you to count the rapidity of the pulse, but it is better to apply two or three fingers when you wish to estimate its other conditions.

17. In feeling the pulse you must take notice of its frequency, regularity, fulness, strength of pulsation, and its resistance to pressure. The pulse is most frequent in infancy (110—120 in the minute), in children of three years of age it ranges from 90 to 95, and in adults is usually about 72. It is generally very slow in com-

pression of the brain; quick in fevers, inflammation, and where there is great debility. The pulse is said to intermit when a beat ceases to be felt every few pulsations. It is irregular when the beats occur at irregular intervals. The strength and fulness of the pulse are of great importance, as they indicate the force with which the circulation is carried on. It is strong in young persons and in hypertrophy of the heart; feeble in dilatation of that organ, and in those weakened by disease. The compressibility of the pulse must always be considered. If the pulse ceases to be felt on a slight pressure of the finger, you may be sure that the circulation is in a feeble state. In old persons you may mistake a feeble pulse for a strong one, from the coats of the artery being thickened. To ascertain if this is the case, compress the vessel and then move your finger along it, when you will readily detect any hardness of the coats that may be present.

18. You may suspect disease of the heart if the patient complain of pain in the left side, if there is either palpitation, blueness of the lips and face, difficulty of breathing, cough, expectoration, dropsy of the limbs, or if he has an irregular or intermitting pulse. Ascertain if his symptoms have commenced suddenly (acute disease), and if so, begin at (19); but if gradually (chronic disease), pass on to (31).

Section I.

ACUTE DISEASES OF THE HEART.

19. The acute diseases include pericarditis (first and second stage), endocarditis, and nervous palpitation. It will simplify your diagnosis to begin with percus-

sion, for if the cardiac space is much enlarged you have to deal with pericarditis accompanied by effusion; if not, any of the others may be present.

20. *a.* You find the dulness over the heart's space increased and of a pyramidal shape, the apex being above; the heart's sounds, especially the first, are diminished, the impulse lessened, sometimes undulatory. The apex often beats above and to the left of its normal position.

The disease is *pericarditis with effusion of fluid.*

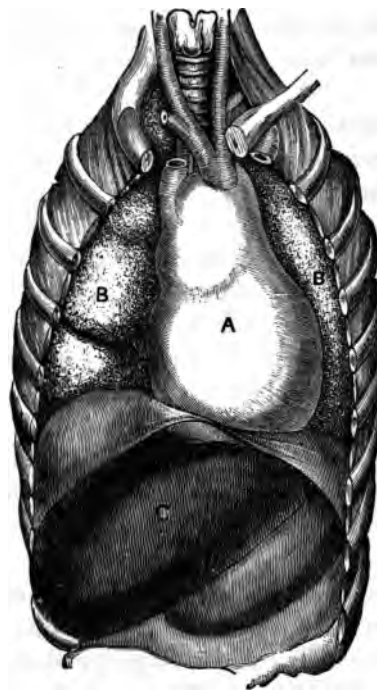
21. In this stage there is rarely much pain or tenderness, but difficulty of breathing and anxiety are usually complained of. The pulse is rapid or irregular, and the patient lies on the back, and is unwilling to change his position. The sounds are diminished on account of being transmitted through fluid; the apex is raised by the pressure of the fluid. The extension of the dulness to the left, beyond where the apex beats, is one of the most certain signs. The line of dulness varies with the position of the patient; it is wider when he lies down than when he stands. You should mark out with ink the area of dulness, and daily observe its increase or diminution.

22. You are most likely to mistake hydropericardium for this stage of the disease. Pericarditis is usually attended in the early stage with pain and tenderness on pressure, which is not the case in hydropericardium. Pericarditis is almost always the result of acute rheumatism, kidney disease, pyæmia, or scarlatina; but dropsy of the pericardium seldom occurs except as a sequel to hydrothorax. An increased area of dulness in the heart's region may arise from pleurisy, but there is then also dulness behind and at the side of the left chest,

attended with absence of the sounds of the voice and of the breathing.

23. *b.* The dulness over the heart's space is not much, if at all, increased in extent, the sounds are normal, but

FIG. 5.



Increased dulness on percussion, of pyramidal shape.

Impulse lessened.

Sounds feeble, especially the first.

Shows the position of the pericardium when distended with fluid. A. The heart. B. The lungs. C. The liver. (SIBSON.)

are attended with a double superficial, creaking sound; the impulse of the heart is generally increased.

The disease is *pericarditis with exudation of lymph.*

24. Pericarditis is generally attended with pain over

the heart, increased by pressure, movement, or inspiration. There are anxiety, difficulty of breathing, fever; the pulse is quick, often irregular or intermittent. Remember that the disease may be present without pain or any other symptom pointing to the heart, or the patient may suffer only from delirium, or be affected with severe and persistent vomiting. Therefore frequently examine the heart in all cases of rheumatic fever or kidney disease.

25. The creaking or rubbing sound is produced by the surfaces of the pericardium roughened with lymph rubbing against each other. You may mistake this sound for a murmur arising from endocarditis. You must therefore note that in pericarditis the sound usually attends both the systole and diastole, that it is superficial, is apt to vary in its character, and is confined to the region of the heart; that by pressure with the hand or stethoscope you may often alter the character of the sound, or make it louder, and that pericarditis is generally attended with pain and tenderness. Pericarditis and endocarditis, however, frequently occur together. A friction-sound in the heart's region often arises from pleurisy. When you suspect this to be the case, make the patient stop his breathing, and the creaking will usually cease if it arises from inflammation of the pleura only. There are no signs which certainly indicate the existence of pericardial adhesions. The most trustworthy are, that the area of the heart's dulness does not alter, either with a change in the patient's position or deep inspiration; that the point at which the apex strikes the chest is unaffected by change of position or full inspiration; and that one or more intercostal spaces, or the epigastrium, seems drawn in along with each pulsation of the heart.

26. *c.* One of the heart's sounds, or both, is accompanied or replaced by a lengthened blowing sound (a murmur).

The disease is *endocarditis.*

27. The murmur is the result of the thickening, roughening, or imperfection of one of the valves. Endocarditis is accompanied by anxiety, hurried breathing, increased impulse of the heart, rapid and often irregular pulse, cough, and fever. Like pericarditis, it is generally developed in the course of rheumatic fever or diseased kidneys, and may be present without any symptoms likely to direct attention to the heart.

28. The chief difficulty is to ascertain whether a murmur arises from *recent* endocarditis, or is produced by old valvular disease. The diagnosis is determined by the presence of fever in endocarditis, and by the absence of the enlargement of the heart that always follows long-standing alterations in the valves. The murmur is usually loudest at the apex, because the mitral is generally the valve inflamed. In both endocarditis and pericarditis increased action of the heart often precedes the development of the stethoscopic signs.

29. *d.* The heart's sounds are too loud and clear, the impulse increased, but abrupt, quick, and brief; the apex beats in its natural place, and the pulse is not permanently irregular.

The disease is *nervous palpitation.*

30. Nervous palpitation arises from sympathy with some other derangement. The beating of the heart is generally more distressing than when organic disease is present. The most common causes of the complaint are indigestion, gout, rheumatism, disordered menstruation, the excessive use of tobacco, tea, or alcoholic stimu-

Section II.

CHRONIC DISEASES OF THE HEART.

31. The chronic diseases of the heart are hypertrophy, dilatation, hydropericardium, diseases of the valves, and fatty heart. Mark out by percussion the size of the organ, and observe where the apex strikes the chest; the first three diseases are always attended by an enlarged area of dulness, the other two are not necessarily, although often so, on account of their frequent association with the former.

A. *You find the area of dulness increased.*

32. *a.* The first sound of the heart is dull, muffled, prolonged; the second rather lower pitched than natural, the impulse increased, slow and heaving, the apex beats at a lower space than in the normal condition.

The disease is *hypertrophy of the heart.*

33. The pulse is generally firm and strong. The increased impulse arises from the greater strength of the organ, and the sounds are deadened because transmitted through so large a mass of muscle. Hypertrophy of the heart is generally accompanied by cough, expectoration, and dyspnœa; but as it seldom exists alone, but is usually the result of some disease of the valves, lungs, or kidneys, the physical signs and symptoms present in each case vary according to the existing complications. Thus, we usually find murmurs from valvular affections, or the symptoms of kidney disease present themselves. When the left ventricle is chiefly affected, the apex beats below its normal position, and the caro-

tids pulsate violently; when the right ventricle is mainly diseased, the apex extends outwards, seldom downwards, pulsation may be observed at the epigastrium, the second sound is louder over the pulmonary than over the aortic valves, and there are often swelling and pulsation of the jugular veins.

34. *b.* The first sound of the heart is clear, short, and sharp, resembling the normal second sound, the action often irregular, the impulse feeble, and sometimes slightly undulatory; the apex beats at a lower point than natural.

The disease is *dilatation of the heart.*

35. The pulse is small, feeble, or irregular and intermitting. The most prominent symptoms are distressing palpitation, dyspnœa, cough, expectoration, blueness of face and lips, dropsy, disordered digestion, and scanty urine. All these symptoms result from the enfeebled action of the heart. The feeble impulse and loud sounds arise from the opposite causes to those of hypertrophy. Murmurs are often present from coexisting affections of the valves. The most common causes of dilated heart are diseases of the valves and emphysema of the lungs. Emphysema masks the enlargement, by causing the heart's region to be abnormally clear on percussion; it also pushes the heart, even when healthy, downwards towards the epigastrium.

36. Hypertrophy and dilatation generally coexist; when the hypertrophy is greater than the dilatation, the dulness of the heart's space is chiefly increased from above downwards, but when the dilatation is in excess, the dulness is greater transversely.

37. *c.* The heart's sounds are feeble and distant; the impulse lessened, sometimes undulatory; the shape of

the dulness on percussion is pyramidal, the apex of the pyramid above.

The *disease is either hydropericardium or chronic pericarditis.*

38. Hydropericardium seldom occurs except as an accompaniment of hydrothorax and general dropsy. For its diagnosis from pericarditis with effusion, see (22). Chronic pericarditis may be confounded with dilatation of the heart, as in both there are an increased area of dulness and feeble impulse of the heart; but in pericardial effusion the shape of the dulness is pyramidal, and the sounds are feeble; in dilatation the dulness is square, and the sounds are clear and sharp. Pericarditis commences as an acute affection, and in it dropsy is rare, whereas in dilatation the disease is chronic, and is usually accompanied by swelling of the legs.

B. *The area of dulness is not necessarily increased.*

39. *a.* One of the sounds of the heart, or both, is replaced, or accompanied by a blowing sound (a "murmur").

There is disease of *one of the valves of the heart.*

40. When you detect an abnormal sound over the heart's region, you have *first* to find whether it arises from the lungs or heart. Ask the patient to stop his breathing for a few seconds; if it be produced in the lungs, it will of course immediately cease along with the respiration, but will persist if connected with the action of the heart.

41. To ascertain which valve is affected, you must find where the murmur is most intense. You do this by comparing it at different parts of the heart's region, and marking the spot at which it is heard most plainly.

Place the stethoscope on the apex; if the murmur is loudest at the apex (A, Fig. 6), and inaudible, or only faintly audible at the ensiform cartilage, and if it can be heard at the inferior angle of the left scapula, the *mitral*

FIG. 6.

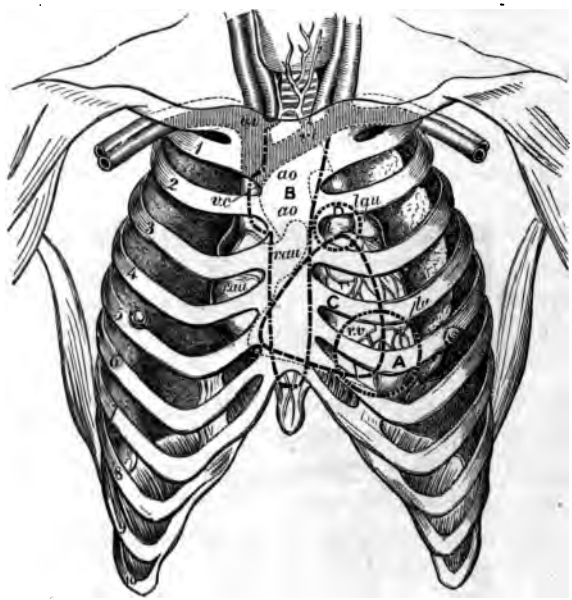


Diagram showing the areas over which the murmurs produced in the different valves of the heart are chiefly audible. A. The seat of the mitral murmur. C. The seat of tricuspid. B. Seat of the aortic. D. Seat of pulmonary murmur. *r. v.* Right ventricle. *l. v.* Left ventricle. *l. au.* Left auricle. *r. au.* Right auricle. *ao.* Aorta. *v. c.* Vena cava. (GAIRDNER.)

valve is diseased, or is incompetent to perform its functions. If its intensity is greatest at the ensiform cartilage (see C, Fig. 6), and it is only faintly heard or inaudible at the apex, the *tricuspid valve* is the seat of the murmur. If it is loudest at the middle of the sternum, just above the third costal cartilage, it depends on an

affection either of the aortic or pulmonary valves (see B and D, Fig. 6); if loudest above the second right costal cartilage, the *aorta or its valves*, if above the second left costal cartilage, the *pulmonary artery or its valves* is the seat of the murmur.

42. Next, whilst listening through the stethoscope, keep your finger on the pulse, and find whether the murmur corresponds with the pulse and first sound of the heart (systolic), or whether it just precedes the first sound (presystolic), or occurs with the second sound (diastolic).

FIG. 7.



Shows the ventricle in the act of contracting (first sound). Semilunar valves, *a*, open. Auriculo-ventricular valve, *b*, closed. Blood passing into arteries, *a*. Pulse at the wrist a little afterwards. Auricle refilling with blood. (DALTON.)

43. Some students fail to understand how the cardiac murmurs are produced, from not keeping clearly in their minds the actions of the heart that correspond to the two sounds. To assist you in this, the diagrams are

added. You will observe (Fig. 7, page 53) that with the first sound the contraction of the ventricles takes place, the semilunar valves (*a*) are open, the blood is poured through them into the arteries, so that the pulse is produced at the wrist, and the auriculo-ventricular valves (*b*) are closed to prevent the blood being driven back

FIG. 8.



Shows the ventricle after its contraction (after the second sound). Semilunar valves, *a*, closed. Auriculo-ventricular valve, *e*, open. Blood flowing from auricle into ventricle. (DALTON.)

into the auricles. As sood as the ventricles cease to contract (Fig. 8) the semilunar valves (*a*) are closed to prevent the reflux of the blood from the aorta and pulmonary artery into the ventricles, whilst the auriculo-ventricular valves (*e*) are opened, so that the blood may flow from the auricles into the ventricles. You will now understand that if a murmur follows the first

sound, that is to say, the contraction of the ventricle, it must be produced either by the blood in its passage through the normal channels (*a*, Fig. 7) or by its being forced through a chink left by the imperfect closure of the auriculo-ventricular valves (*b*); or, in other words, it is either direct (*b*), or regurgitant (*a*) (Fig. 9). If the murmur follows the second sound, it must arise either from the reflux of blood through a chink in the semilunar valves (Fig. 8, *a*) or be produced by the blood flowing from the auricles through a contracted orifice (*e*); or, as seen in Fig. 10, it must be regurgitant at the semilunar valves (*b*), or direct (presystolic) at the auriculo-ventricular valves.

44. *A mitral systolic sound* therefore arises from the blood being forced by the ventricle through a mitral valve, incapable of perfect closure, into the auricle (regurgitant murmur), or it may merely indicate a roughness, swelling, or deposit on the valve itself, without any imperfection in its function (see *a*, Fig. 9).

45. *A mitral presystolic sound* is produced by the blood passing through a constricted mitral valve from the auricle into the ventricle (direct murmur). This murmur is usually most intense at or a little within the point at which the apex beats; it is of a grating character, is ended suddenly by the first sound and impulse of the heart, and is generally attended by a thrill; it indicates thickening of the valve, and consequently an obstruction to the entrance of the blood into the ventricle (see *a*, Fig. 10).

46. *A tricuspid systolic sound* from the blood passing from the right ventricle into the right auricle (regurgitant murmur), or over a roughened surface of the tricuspid valve. It is much more rare than the mitral mur-

mur, and is scarcely audible above the third rib (see c, Fig. 6.)

47. *An aortic systolic sound* from the blood passing

FIG. 9.

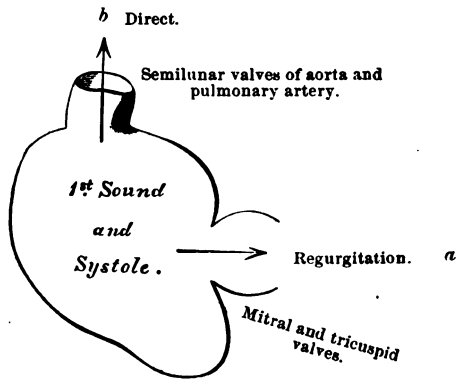
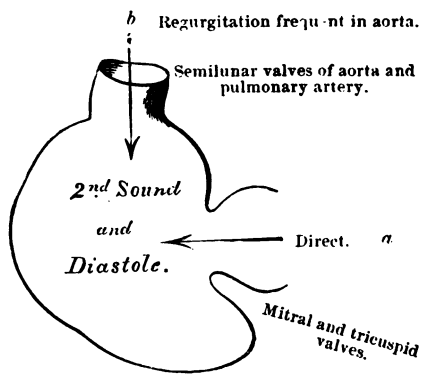


FIG. 10.



Showing the murmurs that may arise in the systole and diastole of the heart. (After HOPE.) The arrows point the directions which are taken by the currents of blood; thus it is seen in Fig. 9, that with the systole you may have a direct murmur in the aortic or pulmonary artery, *b*, or a regurgitant murmur in the mitral or tricuspid valves, *a*, whilst, as in Fig. 10, these may be observed to be reversed in the diastole of the heart.

along the aorta or its valves (direct murmur); it is almost inaudible at the apex, but can be generally heard in the carotid arteries (see *b*, Fig. 9).

48. *An aortic diastolic sound* from reflux of blood from the aorta into the ventricle (regurgitant murmur). It is heard loudly down the sternum, is audible at the apex, and fills up the interval of silence that, in the normal condition, exists between the second and the first sounds of the heart (see *b*, Fig. 10).

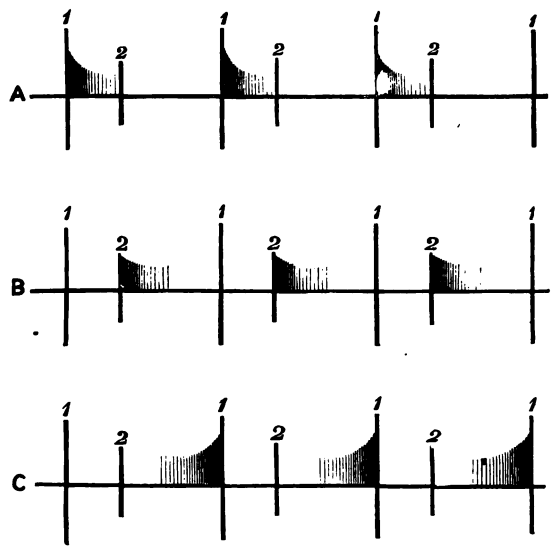
49. *A pulmonic systolic sound* from the blood passing into the pulmonary artery (direct murmur); see *b*, Fig. 9.

The *tricuspid diastolic*, and *pulmonic diastolic*, murmurs are so rare, that the student need not regard them.

50. There is often much difficulty experienced at first, in distinguishing between the mitral presystolic and the mitral systolic murmur, and between the mitral presystolic and the aortic diastolic. Keep your finger on the pulse whilst you are listening to the heart, and carefully watch what relation the murmur bears to the pulse, or in other words to the first sound of the heart. In the following diagram (Fig. 11), copied from Dr. Gairdner, you will obseve that at A a systolic murmur *directly* follows the first sound, and (as shown by the diminished depth of the shading) gradually lessens in intensity until it ceases just before the second sound. At B, the diastolic murmur *directly* follows the second sound, and dies away before the next systole of the heart. At C, on the contrary, the presystolic murmur begins after the second sound and increases in intensity until it is suddenly arrested by the contraction of the ventricle. In addition to this the mitral presystolic murmur is of a grating char-

acter, is usually attended by a "thrill" perceptible to the hand, and is often confined to a limited space about the apex. The systolic murmur is usually soft, seldom attended with thrill, and may be generally heard towards the axilla and at the angle of the left scapula. When a

FIG. 11.



A. Shows the relation of the systolic murmur to the sounds of the heart. B. Shows the relation of the diastolic murmur. C. Shows the relation of the presystolic murmur. (GAIRDNER.)

systolic and presystolic mitral murmur coexist, listen for the former towards the axilla, for the latter at, or to the right of the apex. The diastolic aortic is generally soft, is heard loudly at the sternum opposite the fourth left costal cartilage, is attended with a jerking pulse, and usually the second sound is inaudible at the root of the neck.

51. As a valve seldom remains long imperfect without giving rise to hypertrophy and dilatation, you meet with the physical signs and symptoms of these conditions in most of the cases in which a murmur has for some time been audible. You therefore find cough, expectoration, difficulty of breathing, and general dropsy; the pulse in the earlier stages may be small and regular, in the latter stages it is irregular or intermitting. An obstruction at the aorta is usually compensated for by hypertrophy of the left ventricle, so that the general symptoms are often slight, until dilatation begins, when congestion of the lungs and dilatation of the right side of the heart result from the imperfect emptying of the left ventricle. Aortic regurgitation, if slight, may for some time be accompanied only by difficulty of breathing, and a cramping pain of the chest and arms on exertion; the pulse gives a peculiar thrilling sensation to the finger, and the superficial arteries are seen to pulsate with each beat of the heart. Imperfection of the tricuspid is usually the result of dilatation of the right ventricle, and produces general dropsy; the external jugular veins can be often seen to pulsate along with the arteries. A *purring tremor* or *thrill* can be frequently felt by the hand applied to the chest in cases of diseased mitral or aortic valves.

52. Small portions of vegetations or of fibrin deposited on diseased valves are liable to be swept away by the currents of blood, and to form plugs (emboli) in the smaller arteries. Thus you may meet with paralysis produced by a softening of the brain resulting from the plugging of a cerebral bloodvessel, or even gangrene of the leg may be produced by an obstruction of the main artery of the limb.

53. The systolic sounds audible above the third costal cartilage, do not *necessarily* arise from disease of the vessels or valves; they are very frequently produced by alterations in the blood. If the patient is young and anæmic, and has no general symptoms of heart disease, the murmur is probably from a deficiency in the quantity of the blood, or an alteration in its quality; but if the heart is enlarged or other valves are diseased, or the patient has suffered from acute rheumatism, or is at or past middle life, the sound probably arises from disease of the vessel or its valves. All diastolic or presystolic sounds indicate structural disease.

54. *b.* The sounds of the heart are feeble, impulse very weak. When along with these physical signs, and without other apparent cause, the patient is exceedingly feeble, subject to palpitation, severe attacks of dyspnœa and *faintings*, and has either a very feeble and quick, or a very slow or irregular pulse, you may suspect *Fatty Degeneration of the heart.*

55. I have put *suspect:* for the positive detection of fatty heart is very difficult, and in many cases, with our present means of diagnosis, impossible. It is generally believed that a white ring round the cornea (arcus senilis) when it is accompanied by other signs, renders the existence of fatty heart probable. Rupture of a fatty heart sometimes occurs, generally in the left ventricle. Death usually takes place instantaneously, from hemorrhage into the pericardium. In rare cases severe pain is suddenly experienced in the region of the heart, and the patient suffers from intense dyspnœa until his death.

56. *Angina Pectoris,* or spasm of the heart, is a severe cramping pain of the chest and arms, coming on suddenly,

and usually during exertion. It is apt to occur in several diseases of the heart, such as affections of the valves, fatty degeneration, and ossification of the coronary arteries.

Section III.

ANEURISM OF THE AORTA.

57. You will often find morbid changes in the aorta after death, even in persons who have manifested no symptoms of disease of the heart or arteries. The most important of these is atheroma. It commences as a thickened patch in the internal coat (the intima). It is generally of a cartilaginous consistence, and is slightly raised above the level of the surrounding membrane. Microscopically, the lamellæ of the intima are separated from each other by a collection of cells, intermixed with thin layers of newly-formed connective tissue. These little masses of cells may soften and be converted into a soft, greasy pulp, to which the name of *atheroma* was given. If the layers of the intima covering these patches ulcerate, the soft parts below them are washed away by the current of blood, and an "*atheromatous ulcer*" is produced. Instead of softening, the cells sometimes calcify, by the deposition of the earthy salts of the blood, and small bony plates result. The above changes are usually referred to chronic inflammation (chronic endoarteritis).

58. You will also meet with spots and patches of an opaque yellow color in the lining membrane of the aorta and other large arteries, arising from a fatty degeneration of the intima, and unconnected with the inflamma-

tory process. Old persons and those who have suffered from gout, rheumatism, and syphilis are most liable to disease of the arteries.

59. Morbid changes in the arterial coats lead to a diminution in the elasticity of the vessel. It is consequently apt to yield to the distending power of the blood, and become dilated. This may occur in any part of the course of the aorta, but more especially where the impact of the blood is most forcible, as at the origin of its larger branches, and at the upper curvature of the arch. When its calibre is *uniformly* enlarged and its coats remain intact, the artery is said to be *dilated.* If the dilatation occur at one side only it is termed an aneurism. A dissecting aneurism is produced by the blood escaping through a fissure in the middle and internal tunics, separating them from the outer coat.

60. An aneurism usually continues to increase in size, and the blood admitted into it forms layers of fibrin, partly from the irregularities on its inner surface affording favorable points on which it may be deposited, and partly from the state of rest to which the blood is reduced whilst it remains in the sac.

61. The first effect of an aneurism is to cause pressure upon some of the structures by which it is surrounded. If situated in the ascending aorta, it may force itself outwards and cause absorption of the ribs and sternum, forming a tumor visible on the surface of the chest. In other cases it compresses the trachea, bronchi, or œsophagus, obstructs some of the large arteries, distends the veins of the head, neck, and chest, or paralyzes the recurrent nerve or sympathetic. Ultimately it may cause death by bursting into the pericardium, pleura, œsopha-

gus, or other parts, or the patient may sink from exhaustion.

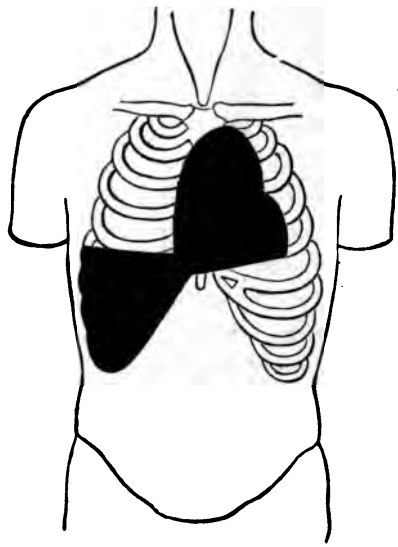
62. The diagnosis of aortic aneurism is often very difficult, and not unfrequently you have to surmise its presence from the absence of all other morbid conditions equally capable of giving rise to the symptoms of the patient.

63. When the aneurism has proceeded so far as to form a tumor on the chest its detection is easy. You find a pulsating tumor, dull on percussion, often accompanied by a systolic, in some cases also by a diastolic murmur, and most generally situated on the right side of the sternum, in the second intercostal space. In others, although no distinct tumor is present, you may discover a part of the chest over the aorta dull on percussion, and you may hear a murmur at this part.

64. When the arch is affected you may be unable to detect either dulness or murmur, and then your judgment must be guided by the signs of pressure on some of the parts near the aorta. Thus, dyspnœa is one of the most common symptoms, from pressure on the trachea or bronchial tubes. It often occurs in paroxysms, and may be relieved or aggravated in certain positions. It may be accompanied by slight spittings of blood, which recur from time to time. Sometimes you find a difference in the loudness of the respiratory murmur, either in one lung as compared with the other, or in one lobe of either lung. Difficulty of swallowing often occurs, from obstruction of the gullet. In many cases it varies greatly in amount, at one time of the day the patient may be able to take solids, when at another even liquids can be scarcely swallowed. Cough is very general, and may come on in severe paroxysms. Not un-

frequently the voice alters, and becomes harsh, whispering, or shrill, from the pressure on the recurrent nerve producing paralysis of one of the vocal cords, but you will find great variations in tone at different times. An

FIG. 12.



Pulsating tumor; dulness on percussion; murmur; often diminished respiration and paralysis of the vocal cord on the affected side.

Diagram of a case of aortic aneurism that projected on the left side of the chest, the heart being also enlarged. The dark shading shows the extent of dulness on percussion over the tumor, heart, and liver. (MR. S. MACKENZIE.)

inequality between the pulses in the carotid, subclavian, or radial arteries, is a very valuable sign, the most certain indications of which are given by the sphygmograph. The veins of one side of the chest or neck may be swollen, and this frequently gives the first hint of the true nature of the case. A contracted state of one pupil has been sometimes remarked.

65. In dilatation of the aorta you have not the signs

of pressure that you encounter in sacculated aneurism, but you may sometimes detect the presence of this condition by an increased pulsation and a thrilling above the notch of the sternum. In other cases you may suspect it from a loud, almost metallic second sound of the heart in a person whose radial arteries seem to be thickened and diseased.

66. The sphygmograph often affords valuable information in cases of aortic or subclavian aneurism, and as it is also of use in the diagnosis of diseases of the heart, you should practice yourself in its employment.

67. The instrument consists of a flexible steel spring, having at its end a small plate of ivory for the purpose of resting on the radial or other artery. The movement communicated to the spring by the pulse is transmitted to a light lever, which registers the motions of the artery upon a piece of paper or smoked glass, travelling at a uniform rate by means of clockwork.

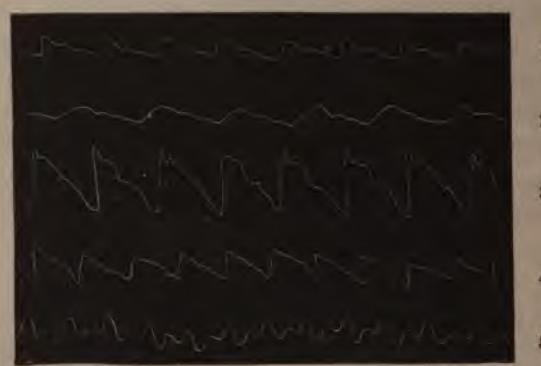
68. The chief difficulty in the use of the sphygmograph is the exact application of the spring to the pulse, and Dr. Sanderson gives the following directions to facilitate this: "The artery can be best explored just as it passes over the ligament which extends across the most projecting part of the styloid process of the ulna; for above it is surrounded by a quantity of fatty cellular tissue, and lies on the surface of the pronator quadratus muscle; whereas beyond, in the interval between the ligament and the scaphoid prominence, it sinks below the tendon of the flexor longus pollicis. In order that the centre of the convex ivory plate which shields the end of the spring may press on the artery at the point indicated, the best rule to follow is to make the edge of the block next the spring coincident with a line drawn

across the wrist from the radial spine, while its inner edge rests upon the tendon of the flexor longus pollicis, and on the prominence of the scaphoid."

69. In Fig. 13, No. 1, you see a tracing of the normal pulse, and you will remark that there is a succession of curves, each one of which presents an ascending line, a summit, and a descending line.

70. As the ascending line is produced by the left

FIG. 13.



Sphygmographic tracings in different diseases.
(SANDERSON and FOSTER.)

ventricle throwing its contents into the arteries, it is evident that the more quickly the heart overcomes the forces opposed to it—viz., the elasticity of the vessels and the tension of their contents—the more vertical will be that line. Thus, in No. 3, Fig. 13, the line is vertical; the case was one of aortic regurgitation, and the heart was able to throw its blood rapidly into the vessels emptied by the escape of their contents into the ventricle; but it is oblique in No. 2, Fig. 13, where an ob-

struction at the entrance of the aorta caused a difficulty in the distension of the arteries. At No. 4, Fig. 13, a tracing is given of the irregularity of the pulse caused by disease of the mitral valve.

71. In the normal pulse the line of descent is more oblique than that of ascent, because the tension of the arteries gradually subsides in proportion as the elasticity of the vessel enables it to empty itself through the capillary system. In aortic regurgitation the fall is sudden; in cases where the arteries are thickened it is usually very oblique.

72. In certain cases, strongly marked undulations occur in the line of descent (dicrotism). The best marked examples are to be found in typhus (No. 5, Fig. 13). In aneurism of the descending thoracic aorta the dicrotism is often much increased in both pulses, particularly in the right.

CHAPTER III.

DISEASES OF THE LUNGS.

73. THE principal morbid changes affecting the pleura are, pleurisy, hydrothorax, pneumothorax, tubercular and cancerous deposits; those of the lungs are, bronchitis, dilatation of the bronchi, emphysema, congestion, pulmonary apoplexy, pneumonia, tubercle, and cancer.

74. PLEURISY, or inflammation of the pleura.—In the first or dry stage the surface of the membrane is red, roughened, and covered with a layer of lymph or semi-gelatinous matter. This stage may terminate by recovery or by adhesion of the opposite sides of the pleura; but generally a turbid fluid, mixed with flakes of coagulated lymph, is also effused; in other cases the cavity of the chest becomes distended with pus (*empyema*). Microscopically, the first change in acute pleurisy consists in the dilatation of the capillaries of the serous membrane, producing the redness visible to the naked eye. The epithelium falls off, leaving the membrane roughened, and the bare surface becomes covered by lymph exuded from the dilated bloodvessels. This lymph consists of cells, nuclei and fine fibres. The fibres result from the coagulation of the fibrin of the liquor sanguinis, the cells and nuclei are exudations from the overloaded vessels, or are derived from proliferation of the epithelial cells. If the opposed surfaces of the inflamed membrane remain in contact, the cells entangled in the fibrin assume a spindle-shape, their processes unite and form con-

nective tissue, bloodvessels are developed from the vessels of the inflamed pleura on either side, and the false membrane thus becomes organized (see Fig. 14). The opposed surfaces are in this way united by a layer of connective tissue, which constitutes what are termed "adhesions." When the opposite surfaces of the inflamed pleura are separated by an abundant sero-fibrin-

FIG. 14.



Showing the microscopical appearances of inflammatory exudation in the process of organization (pericarditis in a horse). The newly-formed bloodvessels (injected) are seen in the midst of a material composed of cells; they vary in size, and seem more like channels than vessels.

ous effusion, union occurs by an action affecting the connective tissue of the serous membrane itself. The false membrane consists externally of coagulated fibrin, but below this of a layer of cells formed by the proliferation of the connective tissue cells of the subepithelial structures. This cellular layer becomes permeated with vessels, the cells become spindle-shaped, and connective

tissue is produced. The shreds and flakes of fibrin in the fluid distending the pleural sac undergo fatty degeneration, soften, and are absorbed along with the fluid. The opposite surfaces are thus brought into contact, and unite as in the former case. If suppuration occurs, the pus-cells are derived in part from the exudation of the white blood-globules and their subsequent division, and partly from the proliferation of the cells of the false membrane and of the connective tissue of the neighboring structures.[1]

The first effect of pleurisy is to set up fever; afterwards if the amount of fluid be large, the walls of the chest are pushed outwards, the lung is compressed against the spine, is flattened, reduced in size, and feels tough and leathery, its outer surface is coated with lymph, and, on being cut into, its texture appears to be void of air. The opposite lung is usually much congested. If the effusion be on the right side, the diaphragm and liver are displaced downwards; if on the left, the heart is pushed to the right side of the chest. If the fluid is absorbed and the lung is incapable of expansion, the whole of the affected side contracts, and the spine presents a lateral curvature. Pleurisy often occurs in cases of disease of the kidneys, or follows scarlet fever or measles. Its most common exciting causes are—1. Injuries, such as fractures of the ribs, and the bursting of abscesses of the lungs. 2. Inflammations of neighboring organs—pneumonia, diseased bones, &c. 3. Cancer or tubercle of the lungs or other parts. 4. Exposure to cold.

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[1] The microscopical appearances are nearly the same in inflammation of all the serous membranes. The above description may therefore be applied to pericarditis, peritonitis, &c.

75. HYDROTHORAX, or water in the chest.—This is a form of dropsy in which a straw-colored fluid is effused into the cavity of the pleura. The pressure of the fluid produces congestion of the lungs by preventing their free expansion. It is distinguished from pleuritic effusion by the absence of flakes of lymph, or of thickening of the pleura. It usually occurs along with disease of the heart, kidneys, or liver.

76. PNEUMOTHORAX, or air in the pleura.—This arises from a communication taking place between the bronchial tubes or air-cells of the lung and the cavity of the pleura. The most common cause is the rupture of a cavity in the lung, but in rare cases the air gains an entrance from other organs. The immediate effect of the admission of air into the pleural cavity is to cause collapse of the lung and consequent danger of suffocation. If the patient survives, inflammation is set up, lymph is effused, and fluid or pus collects in the pleural sac.

77. BRONCHITIS, or inflammation of the bronchial tubes.—In the acute stage the mucous membrane of the tubes is red, rough, soft, thickened, and covered with mucus or a muco-purulent fluid; sometimes ulceration takes place. In chronic cases the muscular structure is increased, and the tubes are thickened and dilated. The microscopical appearances are the same in inflammation of all the mucous membranes. Three forms of inflammation are recognized, the catarrhal, the croupous, and the diphtheritic. The catarrhal is most commonly met with in the bronchial tubes.

In *acute catarrhal* inflammation, the bloodvessels are overloaded with blood, and thus produce the redness visible to the naked eye in those membranes, as in the throat, that are open to inspection during life. The

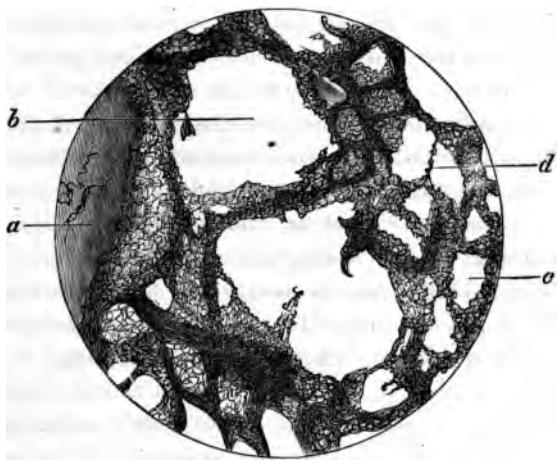
swelling arises partly from this dilatation of the vessels, and partly from the exudation of the more fluid parts of the blood, producing œdema of the tissues. The lymph-follicles become enlarged from an increased formation of cells in their interior. An augmented secretion of mucus takes place. The mucus presents a vast number of cells, which are partly formed by the pre-existing epithelial cells, and are in part leucocytes exuded from the distended bloodvessels. When pus-cells present themselves in large numbers, they are probably also to some extent produced by the proliferation of the subepithelial cells of the connective tissue. In *chronic catarrh* the cells of the connective tissue elongate, so as to form new connective tissue, and, in this way, the thickening and increased density of the mucous membrane are produced.

When the smaller tubes are inflamed the disease is termed *capillary bronchitis*, and the danger to life is proportional to the minuteness of the tubes affected, because the inflammatory swelling is apt to choke the openings into the air-cells, and thus prevent the due aeration of the blood. Acute bronchitis in children and old persons often causes collapse of the air-cells. Chronic bronchitis gives rise to dilatation of the bronchial tubes, either into cavities or into irregularly expanded tubes. The chief exciting causes of bronchitis are: 1. Impeded evacuation of the bronchial veins, as in diseased mitral valve. 2. Imperfect expansion of the chest, as in dropsy of the abdomen. 3. Irritating dust or vapors. 4. Fevers, for example, measles, influenza. 5. Cold and sudden atmospheric changes.

78. EMPHYSEMA.—There are two forms of this disease—*vesicular*, in which the air-cells are dilated or a number of them are merged into one; and *interlobular*,

when the air has escaped into and distends the connective tissue of the lungs. In *vesicular* emphysema the lungs are increased in volume and lose their elasticity, they do not collapse when the chest is opened, the air-cells are greatly dilated, and often appear like little bladders below the pleura. Microscopically, the intercellular passages first appear to be dilated. Two or more having come into contact, an opening takes place

FIG. 15.



Microscopical appearance of a section of a lung affected with emphysema. *a*. Bronchial tube. *b*. A space formed by the fusion of a number of air-cells, the walls of which have been destroyed. *c*. A dilated alveolus. *d*. The walls of an alveolus in process of destruction, the bloodvessels being obliterated.

between them, and they are gradually fused into one. In other cases, the air-cells present the chief enlargement. The pulmonary capillaries are, by the pressure of the dilated cells, gradually diminished in size, or they become impervious and are represented only by cords (see Fig. 15).

The increased size of the lungs presses the ribs outwards so that the chest becomes barrel-shaped; it also pushes the heart and diaphragm downwards. The loss of the elasticity of the lungs calls into play an increased action of the expiratory muscles, which become enlarged, and the blending together of many neighboring air-vesicles compresses the bloodvessels of the affected parts, and thus induces obstruction to the circulation of the blood, which, again, sets up hypertrophy of the right ventricle of the heart (Fig. 3). The free edges of the lungs are chiefly affected by emphysema, consequently they overlap the heart, and occupy the upper part of the hepatic region. Vesicular emphysema is said to be *vicarious*, when the affected parts have become dilated to compensate for the collapse or imperfect expansion of some other portions of the lung that have been wasted by previous disease. It is termed *substantive* when it occurs from causes primarily affecting the air-cells. For example, it takes place in hooping-cough, from violent expiratory efforts whilst the glottis is closed, and therefore the parts least supported, such as the apex of the lung, are forcibly dilated. Diminished elasticity of the lung or of the parietes of the chest tends to the same result, by allowing the air-cells to remain in an over-distended condition. In some cases emphysema seems to be produced by a softening of the walls of the air-vesicles arising from imperfect nutrition.

79. CONGESTION OF THE LUNGS.—This is one of the most common morbid appearances found after death. The lung is loaded with blood, is of a dark color and heavy, but it crepitates under the finger and floats in water; when the part is washed the cellular structure is seen to be unaffected. Œdema, or dropsy of the lung,

results from long-continued congestion; in this condition the lung is red and swollen, and, on being cut into, a large quantity of frothy fluid mixed with blood flows from the bronchial tubes and air-cells in which it had been contained.

Congestion of the lungs may be active or passive. The *active* form is most frequently found when the circulation in the opposite lung has been obstructed by inflammation, pleurisy with effusion, or pneumothorax. *Passive* congestion occurs when the flow of blood from the pulmonary veins is obstructed, as in disease of the mitral valve, or in failure of the heart's action in fevers, &c.

80. The term "BROWN INDURATION" has been applied to a form of chronic congestion arising generally from heart disease. Microscopically, the capillaries are greatly elongated and dilated, so as to project into, and diminish, the cavity of the air-vesicles. The interlobular connective tissue is also somewhat thickened. The brown color is derived from an alteration of hue in the blood that has been extravasated by the long-continued congestion.

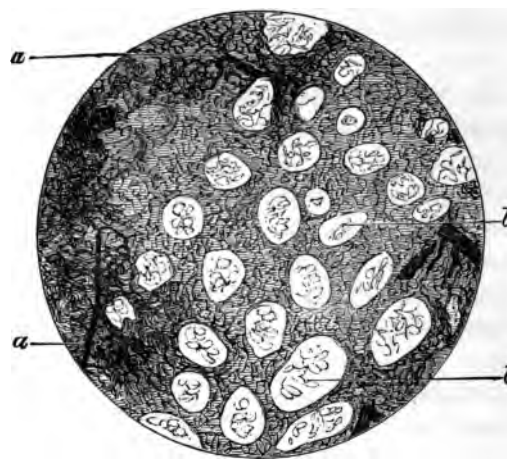
81. PULMONARY APOPLEXY.—The lung is of a dark color, loaded with blood, and heavy. On making a section of it, numerous sharply-defined, black patches of extravasated blood are found, chiefly in the lower lobes. These are softer and more friable than the neighboring parts, do not crepitate on pressure, and sink in water. Microscopically, the air-cells in the dark patches are found to be filled with coagulated blood. Pulmonary apoplexy almost always results from disease of the heart, and notably from disease of the mitral valve.

82. PNEUMONIA, or inflammation of the lung.—There

are three forms of this disease—*croupous*, or *lobar pneumonia*, *catarrhal* or *lobular*, and *chronic*, or *interstitial pneumonia*.

83. *Croupous pneumonia* affects a considerable tract of a lung, and is described as having three stages. First, *engorgement;* second, *red hepatization;* third, *gray hepatization*. In *engorgement* the appearances are those of an intense degree of congestion. In *red hepatization* the lung is somewhat enlarged; it is red colored, solid like

FIG. 16.



Microscopical appearances in commencing red hepatization (in an antelope). *a*. The alveoli completely filled with the exudation, so that their walls cannot be distinguished. *b*. Walls of the alveoli still visible, although they contain exudation. The blood-vessels have not been capable of injection, on account of the pressure of the exudation upon them.

liver, friable, heavy, sinks in water, and appears granular when cut or torn. Microscopically, in *red hepatization* the air-vesicles are seen to be filled with an exudation composed of cells of various forms, held together by co-

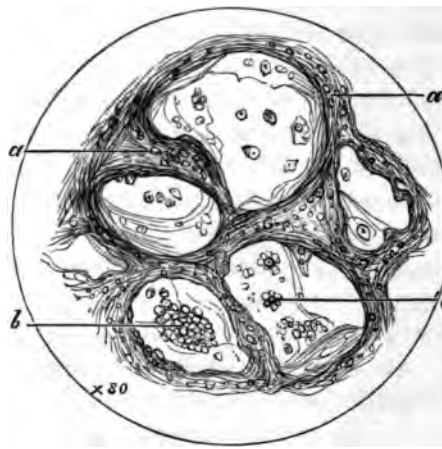
agulated fibrin, and the smaller bronchial tubes are usually choked with plugs of lymph (see Fig. 16). The walls of the air-vesicles are somewhat swollen by the engorgement of the capillaries, but they are not thickened by exudation. In *gray hepatization* the tissues are of a dirty-gray color, solid, heavy, easily broken down by the finger, and sink in water. Microscopically, an abundant proliferation of the cells of the surrounding connective tissue and of the epithelial cells of the air-vesicles takes place, so that the exudation is loosened from the walls of the alveoli. The contents are further liquefied by changes in the coagulated fibrin, and by fatty degeneration of the cells of the exudation, so that the mass is softened, and rendered capable of removal by absorption and expectoration.

Croupous pneumonia may terminate by resolution or it may go on to abscess or gangrene, or may leave unabsorbed deposits that become "cheesy," and produce consumption. In abscess the inflamed part breaks down into an irregular-shaped cavity, filled with pus and the débris of lung-structures. In gangrene a portion of the diseased tissue becomes of a dark color, is very friable, and has a very fetid odor. Croupous pneumonia is often associated with pleurisy; it usually begins at the lower lobes, spreads upwards, and is commonly confined to one lung.

84. *Acute catarrhal* or *lobular pneumonia*, called by some *bronchopneumonia*, is a disease often observed in children, and in them it usually occurs in the parts that have become collapsed from bronchitis. The morbid appearances are often limited to single lobules, which are firm, and of a red color; when cut, they present a smooth, not a granular surface, and a bloody fluid can

be squeezed out of them. Microscopically, the capillaries surrounding the air-vesicles are dilated and engorged with blood. The epithelial cells of the alveoli become enlarged, increase in numbers by proliferation,

FIG. 17.



Acute catarrhal pneumonia as seen under the microscope (in a case of dilated bronchial tubes). *a*. The walls of the alveoli somewhat thickened. *b*. Cells which have formed in the alveoli.

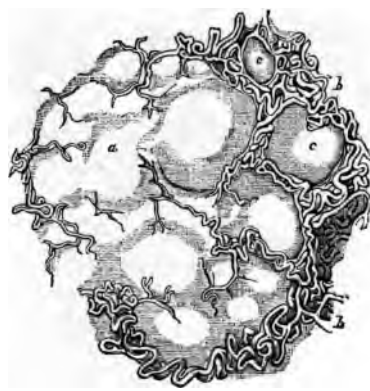
and, along with a serous fluid effused from the vessels, fill up the cavity of the air-cells (see Fig. 17).

85. *Chronic interstitial pneumonia* (*fibroid disease of the lung*).—In this condition the substance of the lung is hard, of a dark-gray or black color, traversed by whitish or black bands of fibres, which often surround old masses of tubercle, or the whole tissue may be broken up into cavities. The pleura is generally thickened, and the bronchial tubes are thickened and dilated. Microscopically, the walls of the alveoli are greatly thickened by newly-formed fibrous tissue which replaces

the elastic fibres. This often extends inwardly, lessening the cavity of the air-vesicles, which, in other cases, are blocked up with epithelial and other cells. In some cases, the only evidence of this form of pneumonia consists in the thickening of the connective tissue situated between lobules which are occupied by tubercular deposits.

86. TUBERCLE IN THE LUNG constitutes the disease named phthisis pulmonalis (consumption). Tubercle occurs in almost every organ of the body, but is most

FIG. 18.



Tubercular deposit in the lung, as seen under the microscope. (RAINEY.) *a*. Tubercle which has broken down the walls of the air-cells in which it was deposited. *b*. Bloodvessels. *c*. Single air-cells filled with tubercular matter.

frequently met with in the lungs. It presents itself in three stages—*consolidation* or *deposition*, *softening*, *ulceration*. In the stage of *deposition* the tubercle may be scattered through the lungs in the form of small, round, hard, gray, semi-transparent granules (gray or miliary tubercles); or it may be present in the shape of hard, opaque, yellow, cheesy masses (crude or yellow

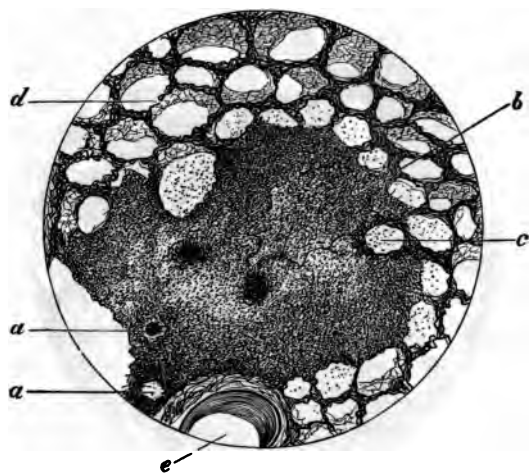
tubercle). Sometimes the tubercle dries up into a chalky mass (obsolete tubercle). Generally, it softens, inflammation is set up in the surrounding structures, which become soft, friable, and loaded with blood: this is the second stage, or that of *softening*. *Ulceration* succeeds, and one or more ragged, irregular-shaped cavities are produced, forming the third stage. The cavities may either increase in size, and be found after death filled with pus and broken-up tubercle and lung-structures, or an attempt at cure may occur; the inflammation of the surrounding structures subsides, and the cavity becomes lined with a smooth membrane.

87. The opinion of Laennec was that the gray or miliary tubercle and the crude or yellow tubercle were only stages of the same disease, and were, in all cases, the results of a similar constitutional affection. This theory was first shaken by the discovery that cheesy-looking masses undistinguishable from crude tubercle may arise from any cellular formation that has perished and remained unabsorbed, and consequently undergone chemical changes. Villemain, next, showed that nodules similar to the gray tubercle can be produced in rabbits and guinea-pigs, by placing beneath the skin minute particles of crude tubercle. Most pathologists now agree in restricting the term *tubercle* to the gray, or miliary tubercle, whilst they consider the crude tubercle, when present in the lungs, as merely the cheesy remains of the unabsorbed products of chronic catarrhal pneumonia.

Chronic catarrhal pneumonia is described as usually commencing in an inflammation of the smaller bronchi. The epithelial cells are increased in number to such an extent that they block up the hollow of the tubes, whose

walls become also thickened by the inflammation. If the plug of epithelium remains fixed in its position, the cells of which it is composed perish, and a cheesy mass is the result. This may either become hardened by a deposit of lime, so that a chalky concretion results, or, as more generally happens, it may act as an irritant, and set up inflammation around it. The access of air to the alveoli being cut off by the plug, they collapse, and be-

FIG. 19.



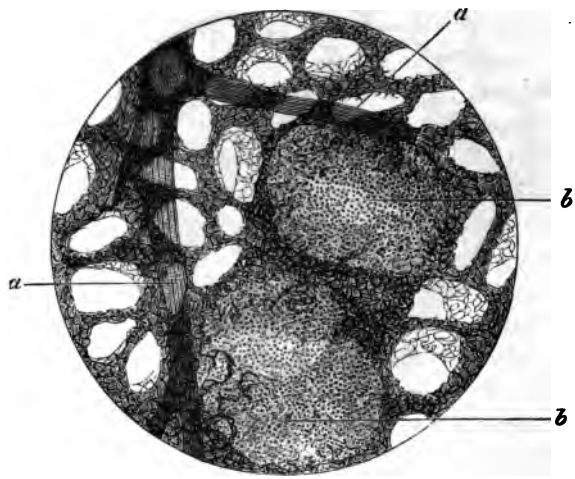
Shows the microscopical appearances of chronic catarrhal pneumonia (crude tubercle), as seen under the microscope. *a.* Bronchial tubes, some of which are seen to be choked with a mass of cells, others are empty from their contents being displaced in the making of the section. *b.* The alveoli filled with cells. *c.* Alveoli only partially filled with cells. *d.* Alveoli in their normal condition. It will be remarked that only a few bloodvessels have been able to be injected where the alveoli are filled with cells.

come filled with cells, as in acute catarrhal pneumonia. The alveoli may be the first to inflame, and the morbid action may extend from them to the tubes. In either case, the contents of the alveoli, being prevented from

escaping through the narrowed bronchi, degenerate, become cheesy, and so form what was formerly called crude tubercle. The pressure of this compresses and obliterates the bloodvessels, as is seen in Fig. 19, ulceration occurs, and the cheesy mass is removed by expectoration.

The miliary tubercle, to which the term *tubercle* is now generally restricted, appears to commence by the growth

FIG. 20.



Showing the microscopical appearance of miliary tubercles in the lungs. *a*. Injected branches of the pulmonary artery compressed by the tubercular formations, *b*, which are also seen to encroach upon the neighboring alveoli.

of cells close to the smaller bronchi and arteries (see Fig. 20). Some describe these cells as arising from the external coat of the smaller arteries; others, as an increased growth of the *adenoid tissue* that normally exists around the vessels and bronchial tubes. (Adenoid tissue consists of a network of fine fibres containing cells

resembling those of lymph. It is found in the lymphatic glands, Peyer's glands and other similar structures.) The little clump of cells thus formed compresses the neighboring alveoli, or sets up chronic catarrhal pneumonia, which goes through the same processes of softening and ulceration that were before described. The miliary tubercle itself, not being pervaded by bloodvessels, softens in the centre, and thus gives rise to a caseous product which may likewise soften and produce a cavity. You must bear in mind that miliary tubercle is always the result of a constitutional affection. It often occurs as an acute disease, in which not only the lungs, but the intestines, pia mater, serous membranes, and, in fact, almost every organ of the body, is found after death to be studded with these minute formations. Such a form of the disease is named *acute tuberculosis*. When miliary tubercle occurs in a chronic form, as in consumption, many pathologists believe it has been produced by the absorption into the blood of some cheesy material (crude tubercle), resulting from the unabsorbed products of inflammation of the lungs or other organs.

88. CANCER OF THE LUNGS, although a comparatively rare disease, may occur under different forms. *Scirrhus* of the lung forms a hard, firm, white, well-defined tumor, from which a juice can be squeezed, which under the microscope is seen to contain fibres along with elongated or caudate nucleated cells. *Medullary cancer*, which is the most common form of the disease, is soft, friable, often bloodstained, and vascular. Cancer may take its rise in the bronchial glands, in the lung itself, or it may be an extension of a similar growth situated in the breast or other adjoining parts. It is usually associated with malignant tumors in some other organ of the body.

(For the microscopical appearances of cancer see Cancers of the Stomach.)

89. From the above description of the morbid changes discovered in the lungs after death, you will be able to understand the physical signs indicating their presence during life.

90. When you strike upon a healthy chest, a clear sound is elicited, on account of the large amount of air contained in the lungs. But if the lung is emptied of air by being compressed by fluid, as in pleurisy, or by its cells being filled with lymph, as in pneumonia, it is evident that the sound on percussion will be no longer clear, but dull. When, on the contrary, the pleura is filled with air, or the cells of the lung are distended, as in emphysema, it is equally plain that the chest will be more resonant than in the healthy condition. In phthisis the amount of dulness will vary according as the air-cells are completely or only partially filled with tubercle.

91. A sound named the "vesicular murmur" is produced by the air rushing into and distending the air-cells and bronchi during inspiration. If from any cause the lung, or a portion of it, acts more energetically than usual, the murmur is increased; this is termed "*puerile respiration*," because in children the vesicular murmur is louder than in adults. If in any way the activity of the lung is lessened, the sound becomes feeble. The most common causes of feeble respiration are obstruction of the air-cells by tubercles, a loss of the elasticity of the lungs, as in emphysema, or some stoppage to the free passage of air through the larynx or bronchial tubes.

92. In a healthy chest the sound produced by the air rushing through the bronchial tubes is masked by the loudness of the vesicular murmur; but if the air-cells

are extensively blocked up, as in pneumonia and phthisis, the bronchial sounds are plainly heard, forming "*bronchial* or *tubular respiration.*" It will be evident that the character of the sound will vary with the size and shape of the passage which the air traverses, and consequently when a bronchial tube is much dilated, or ends in a cavity, we meet with "*cavernous respiration.*"

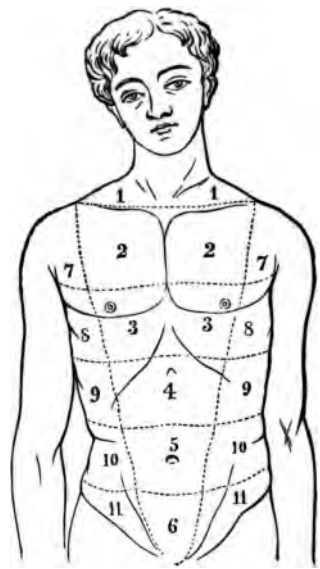
93. The voice generated in a patient's larynx is imperfectly conducted by healthy lung, so that when your ear is placed upon the chest only a buzzing sound is audible whilst he speaks. But if the air-cells are filled with solid materials, as in pneumonia, the voice is conducted to the ear through the bronchial tubes, and you hear the sound more distinctly ("*increased vocal resonance*" or "*bronchophony*"). If a cavity, or very large bronchial tube, is present, the force of the sound is further increased, and "*pectoriloquy*" is the result.

94. When air is forced along the polished lining of a tube, a soft sound is produced; but if the internal surface is roughened or contracted, the nature of the sound is altered. In bronchitis, when the mucous membrane is stripped of its epithelium, or films of hard mucus project here and there, or the calibre of the tube is altered, abnormal sounds, named "*dry râles,*" result. The grave sounds generated in the larger tubes are named "*sonorous rhonchi:*" those of a more piping or whistling character, arising in the more minute bronchi, are called "*sibilant rhonchi.*"

95. When the bronchial tubes, or air-cells, are filled with liquid secretion, the air bubbles through it in passing to and from the lungs, and thus "*crepitations,*" or *wet sounds,* are produced. These are termed large or small crepitations, or "*mucous râles,*" according to the

size of the bubbles, and therefore of the air-passages in which they are generated. Many persons confine the term "crepitation" to the fine râles heard in pneumonia and produced in the air-cells, and call only the other larger moist sounds produced in the bronchial tubes

FIG. 21.



1. Supraclavicular.
2. Infraclavicular.
3. Mammary.
7. Axillary.
8. Infra-axillary.

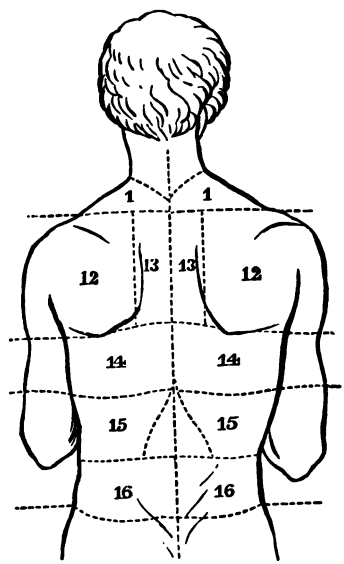
(PAXTON.)

"mucous râles." As small crepitations are not peculiar to pneumonia, I think it is simpler to call all the moist sounds, whether large or small, crepitations.

96. The walls of the chest vary in size, shape, and mobility, in accordance with the condition of the organs they contain. You will therefore find it necessary to

measure the size of the chest in different diseases. The affected side is expanded in pleurisy and pneumothorax; it is contracted when a lung, compressed by effusion, has been incapable of expansion after absorption of the fluid. In phthisis the upper ribs generally fall in, and their

FIG. 22.



1. Supraspinous.
12. Scapular or subspinous.
13. Interscapular (right and left).
14. Infrascapular.

(PAXTON.)

mobility is lessened, from the summits of the lungs being affected with tubercle. In measuring the chest, mark with ink the central points over the spinal vertebræ and sternum, and between these points stretch a graduated tape on each side, taking care that the patient holds his breath in a forced expiration during the trial.

Instruments have been invented to make the measurements more exact, but they are seldom required.

97. For the purposes of diagnosis, the chest is supposed to be divided into regions, with which you should make yourself acquainted. The diagrams on pages 86 and 87 will best enable you to understand the limits of these regions.

98. The symptoms that should lead you to suspect the presence of disease in the lungs are: pains of the chest or side, cough, expectoration, spitting of blood (hæmoptysis), dyspnœa, sweatings at night, loss of flesh.

99. Accustom yourself to the examination of the *healthy* chest by means of percussion and auscultation.

100. As regards percussion, observe that, with the exception of the heart's space, the corresponding regions on each side of the chest sound equally clear. When the patient draws a full breath the percussion-note is clearer, and in forcible expiration it is duller than in ordinary respiration. You must percuss more forcibly over and above the scapula, than on the front of the chest.

101. With regard to auscultation, first place the stethoscope over the *windpipe* of a healthy person. You will find that there are two sounds accompanying the act of breathing—one produced by the air as it enters, the other as it leaves the chest. They are equal in length, and are both rough and harsh, and a distinct interval occurs between the commencement of the one and the cessation of the other. They constitute what is termed "*tracheal* or *cavernous respiration.*" Next place the stethoscope on the *upper bone of the sternum,* opposite the point at which the trachea divides into the bronchi. Here the inspiratory sound is rather longer than that of

expiration, both are softer and less hollow than over the trachea, and they are separated by a slight, but appreciable interval. "This is *bronchial respiration*," or "*tubular breathing*." Again, listen to the breathing in the other parts of the chest, and you will find that the sound of inspiration is soft and breezy; that of expiration is lower in tone, much less prolonged, and follows directly that of inspiration. This is termed the "*vesicular murmur*."

102. Direct the patient to speak when your stethoscope is in the above situations; over the trachea the words seem as though spoken into the ear, and even a whisper is distinctly heard. This is "*pectoriloquy*." Over the upper bone of the sternum, and in the interscapular region, the sound seems to be heard at the cup of the stethoscope. This is "*bronchophony*." In the other parts of the chest the voice produces a buzzing sound, which is often scarcely audible. Place your hand on the chest and you will find a distinct *vibration* when the patient speaks ("*vocal fremitus*").

103. If possible examine your patients when in a sitting position. Take care that such of the clothes as are not removed are loose, for the rustling of flannel may be readily mistaken for sounds produced by disease.

104. Before examining a patient who is suspected to have a disease of the lungs, inquire if his complaint has been of short standing and came on suddenly (*acute*), or if its development was slow and gradual (*chronic*), or it he is subject to *occasional* attacks, his health being good during the intervals. If the disease is acute begin at (105); if chronic, pass on to (133); if occasional, pass on to (156).

Section I.

ACUTE DISEASES OF THE LUNGS.

105. The acute diseases of the lungs are pneumonia, pleurisy, pneumothorax, bronchitis, hooping-cough, acute phthisis. In all these complaints direct your attention first to the lower and back parts of the chest below the scapulæ. Begin your examination with percussion.

106. *A. You find distinct dulness on percussion.* The disease is either pneumonia, pleurisy with effusion, or hydropneumothorax. If there is no dulness, pass on to (117); or if you find abnormal clearness of sound, pass on to (129).

107. *a.* You hear tubular breathing alone, or accompanied by a fine crackling, or a bubbling sound with the inspiration; there is increased resonance of the voice, and increased vocal fremitus.

The disease is *pneumonia.*

108. The crackling and bubbling sounds are termed "*crepitations.*" They arise from bubbles of air passing through the fluid present in the air-cells and smaller bronchi, or, according to others, pneumonic crepitation is produced by the separation of the walls of the air-cells glued together by exudation, by means of the air entering the lung in inspiration. They are heard in the beginning and decline (gray hepatization) of the disease. As soon as the lung becomes solid (red hepatization), you have tubular breathing, or an absence of the respiratory sounds. The increased resonance of the voice and the increased vibration arise from the solid lung conducting the vocal sounds better than a healthy lung.

109. Pneumonia is ushered in by a severe shivering fit, followed by pain of the side, which is not, however, of a sharp or cutting character, as in pleurisy, unless this disease be also present. There are thirst, hot, dry skin, white tongue, little or no appetite, confined bowels, thick scanty urine. The patient generally lies on his back, has a frequent short cough, attended with

FIG. 23.



Illustrating the stages of acute pneumonia.

gluey, rusty-colored, or bloody expectoration, dyspnœa, very rapid breathing, quick but soft pulse, and often delirium at night. If pleurisy accompanies the pneumonia, you will find the physical signs of that complaint also. You may suspect that an abscess of the lung has formed, if severe shiverings occur in the later stage of the disease, and if, at the same time, the expectoration

becomes yellow and contains lung-tissue. Gangrene is indicated by a very foul smell in the breath and expectoration, accompanied by a sudden and very marked prostration of the strength of the patient.

110. The average temperature in the axilla in pneumonia is 104°, average rapidity of the pulse 120, accompanied by about forty respirations in the minute, during the height of the disease; if these are exceeded the case is severe, if they are below the case is slight. During the height of pneumonia there is an absence of chlorides from the urine; you ascertain this by adding a solution of nitrate of silver to the urine, previously acidified by nitric acid, and observing that no precipitate is produced. A crisis or sudden subsidence of the fever is apt to occur on the fourth, sixth, or seventh day of the attack, and is often accompanied by diarrhœa, severe sweatings, or the passage of a large quantity of thick urine. Albumen is often present in the urine, and, if it occurs before the crisis, is an unfavorable sign. When the fever persists for some length of time, becoming increased at nights, and followed towards the morning by profuse perspirations, at the same time that the dulness on percussion remains; or if the disease has been ushered in with profuse spitting of blood, it is probable that the case will terminate in consumption.

111. Œdema of the lung presents small crepitations and bubbling sounds, attended by dyspnœa, cough, and profuse expectoration, but the expectoration is frothy and thin, and there is an absence of decided dulness on percussion and tubular breathing. Œdema generally arises from disease of the heart, kidneys, or liver.

112. You may have dulness on percussion and absence of respiration from collapse of the air-cells (77),

as a sequence of bronchitis or fever. This is chiefly met with in children and old people. You distinguish this condition from pneumonia by the history of the case, the absence of rusty-colored expectoration, and the rapidity with which the affection commences.

113. *b.* You find a diminution or absence of respiratory murmur, of vocal resonance, and of vibration.

The disease is *pleurisy with effusion.*

114. The dulness and absence of respiration are

FIG. 24.



Friction-sound.

Great dulness; respiration absent; vocal resonance absent; vocal fremitus absent.

Diagram showing roughening of the pleura at the middle, and effusion of fluid at the lower part of the chest. (DOBELL.)

caused by the lung being compressed against the spine by the fluid in the pleura. Consequently, the extent of

the dulness corresponds with the amount of fluid. The respiratory sound is louder than natural in the opposite side of the chest. When there is a small quantity of effusion, the dulness may be only perceptible when the patient stands, and it disappears when you make him lie upon his face. In other cases the whole side is dull. If the left side is affected the heart is often displaced, and can be heard and felt to beat on the right of the sternum: when the right side has been attacked, the liver may be pushed downwards, and can be felt below the ribs. The affected moves less and measures more than the healthy side, and the spaces between the ribs are wider, flatter, or more bulging. In most cases tubular respiration can be heard in the interscapular region, and occasionally a peculiar bleating sound (ægophony) may be distinguished at the inferior angle of the scapula when the patient speaks. Friction-sounds may be generally heard at an early period of this stage of pleurisy; as the fluid is absorbed the physical signs diminish. Eventually the affected side may be found shrunken in size and distorted, and the heart may be permanently displaced.

115. The patient lies on the affected side; there is great dyspnœa, and rapid breathing, but there is not necessarily cough, and no rusty-colored expectoration, as in pneumonia. If suppuration takes place (empyema), you will find the patient complain of shiverings and night sweats; the pulse becomes small and frequent, and there is rapid loss of flesh. The matter may burst externally, or may perforate the lung, causing sudden and profuse expectoration of pus.

116. The liver when enlarged may project upwards as far as the fourth rib, and thus simulate a partial

effusion into the right side of the chest. You will find, however, that the line of dulness in such a case is higher in front than behind, and that it descends on a full inspiration, and rises in full expiration, which is not the case in pleuritic effusion. Medullary cancer of the whole lung also produces dulness on percussion, and absence of vesicular murmur; the dulness is, however, seldom quite uniform, small spaces being comparatively clear on percussion; there is not such a complete loss of vocal vibration, the sputa are often bloody or like currant-jelly, and there may be evidence of malignant disease in other organs; there is also a more cachectic aspect than in pleurisy. You distinguish pleurisy with effusion from pneumonia by the tough, blood-colored expectoration and higher temperature of the latter. In pleurisy the chief physical signs are—Enlargement of the affected side and dilatation of the intercostal spaces, displacement of the heart or liver, faintness or absence of vocal vibration and respiratory sounds; in pneumonia they are the increased vocal vibration and the bronchial respiration.

117. *B. There is no dulness on percussion.* It is either pleurisy without effusion of fluid, bronchitis, hooping-cough, or acute phthisis.

118. *a.* The breath and voice sounds are normal, but you hear a superficial rubbing or grating sound accompanying the respiration.

The disease is *pleurisy without effusion of fluid.*

119. The creaking is occasioned by the rubbing together of the roughened surfaces of the pleura (see Fig. 24). Usually it accompanies both inspiration and expiration, but sometimes it can be only heard on full inspiration. It might be mistaken for the dry sound of

bronchitis, and if there is any doubt on this subject, direct the patient to cough; this generally alters the sound in bronchitis, but leaves that of pleurisy unaffected. On account of the pain the movements of the chest are quick and constrained, and the sounds of respiration are feeble.

120. The complaint is generally ushered in by chilliness or shivering. The patient complains of dyspnœa and sharp pain of the side, increased by breathing or coughing. He lies on the unaffected side. The pulse is quick, often hard. There are symptoms of fever, short, hard cough, but no rusty-colored expectoration. This stage of the complaint is generally followed by effusion into the pleura. Pleurisy sometimes occurs as a chronic disease, but the physical signs are the same as in the acute form.

121. You must remember that the sharp pain of pleurisy may be simulated by rheumatism of the muscles, or neuralgia, or severe pain in the side may be the precursor of an attack of herpes (shingles). In none of these are there fever, creaking on inspiration, or dulness on percussion.

122. *b*. You hear the breath-sounds accompanied by dry or moist râles, and there is no alteration either in the voice or vocal fremitus.

The disease is *acute bronchitis*.

123. Accustom yourself to distinguish the dry from the moist sounds of bronchitis. For explanation of the manner in which they are produced, see (94) and (95). Crepitations may be simulated by the rubbing of the stethoscope on the hair of the chest, by the rustling of clothes, and by air in the subcutaneous tissue (emphysema).

124. The patient complains of more or less fever, dull, oppressive pain, or soreness of the chest, often referred to the sternum, cough, and expectoration. The expectoration is at first glairy, or frothy, semi-transparent mucus; afterwards opaque, or puriform. It is never rusty-colored, as in pneumonia, although it may be streaked with blood. When bronchitis of the smaller tubes (*capillary bronchitis*) attacks children, there is greater fever, difficulty of breathing, and altogether more serious symptoms than in the case of adults. When you observe that the epigastrium sinks in, and that the lower ribs are drawn inwards during inspiration, you know that the entrance of the air into the pulmonary vesicles is seriously obstructed. This form of bronchitis is apt to occasion *collapse* of portions of the lung.

125. *c.* The patient is frequently attacked with short fits of violent, rapidly-interrupted coughing, alternating with long-drawn, shrill, crowing inspirations; the seizures usually ending with the expectoration of a thick, glairy mucus, or in vomiting. During the fits the features become red or bluish, the eyes start, and the child seems on the verge of suffocation.

The disease is *hooping-cough.*

126. This complaint is most common in childhood; it occurs as an epidemic, is very infectious, and only affects a person once in his lifetime. It often follows measles or scarlatina. The whoop is produced by spasmodic closure of the glottis. The disease is preceded for many days by fever, discharge from the nose and eyes, and the other symptoms of a "cold." This is succeeded by a decline of the fever, and the appearance of the characteristic cough (convulsive stage). After

some time the violence of the attacks declines, and the expectoration becomes less viscid and smaller in quantity (stage of decline). The disease is often attended with bronchitis, and as the smaller tubes are frequently affected, in fatal cases the air-cells are generally found to be collapsed in different parts of the lungs. Sometimes the patient afterwards suffers from emphysema or consumption. Occasionally death occurs from convulsions.

127. *d.* If along with the physical and general signs of bronchitis the patient has severe fever, an unusual amount of difficulty of breathing, a brown tongue, rapid loss of flesh and strength, and profuse night sweats, you may suspect *acute phthisis.*

128. Acute phthisis usually runs its course in from three to ten weeks. In all these cases examine the expectoration for lung-tissue. Unless you find it you are not justified, in the absence of the physical signs of phthisis, in giving a positive diagnosis.

129. *C. Percussion elicits a clear note, like that of a drum, over one side of the chest* (tympanitic sound). You can have only one acute disease of the chest—viz., *pneumothorax.*

130. *a.* The respiratory sounds, vocal resonance, and vibration, are greatly diminished or are absent, there is convexity of the affected side, bulging of the intercostal spaces, immobility or diminished motion of the ribs, and often displacement of the heart.

The disease is *pneumothorax.*

131. The air in the pleura compresses the lung and thus prevents the respiration in the same way as the fluid of pleurisy does. Inflammation is usually set up in the pleura, and you therefore often find dulness on

percussion from fluid at the base of the chest, and abnormal clearness above. The limits of the dulness vary greatly with the position of the patient; the line of dulness is much higher in front when he is standing than when he lies upon his back. Sometimes you will find

FIG. 25.



Percussion tympanitic; absent respiration; absent vocal resonance; absent vocal fremitus.

Splash on being shaken; percussion dulness; metallic tinkling.

Diagram of the physical signs in pneumothorax. (DOBELL.)

a loud echo with the voice ("amphoric voice"), and a tinkling sound as if produced by the dropping of fluid in a cavity. In other cases, when the patient moves or is shaken, a loud splashing sound is produced.

132. In the majority of instances the air is admitted into the pleura by the bursting of a small cavity; consequently the signs of pneumothorax are usually pre-

ceded by the symptoms of phthisis. When the rupture occurs, as it generally does, during a fit of coughing, the patient is seized suddenly with severe pain of the side, intense dyspnœa, and great faintness, the pulse being weak and fluttering. Afterwards he lies wholly on the affected side, there are blueness of the face and lips, profuse sweating, and more or less swelling of the face and limbs. The accident usually ends fatally. The percussion-note is abnormally clear only in emphysema and pneumothorax, but emphysema is a *chronic* disease in which both sides of the chest are affected, the intercostal spaces are normal, and the respiration audible, though feeble; pneumothorax is an *acute* complaint, in which only one side is enlarged, the intercostal spaces are dilated, and the respiratory murmur is absent.

Section II.

CHRONIC DISEASES OF THE LUNGS.

133. The chronic diseases of the lungs are chronic pleurisy, hydrothorax, phthisis, chronic bronchitis, and emphysema.

134. Commence your examination with percussion. If you find dulness on percussion begin at (135); if you find no dulness, pass on to (150); if the percussion is abnormally clear, pass on to (153).

A. You find dulness on percussion.

135. *a.* The dulness is chiefly or entirely confined to the lower and back parts of the chest, and is associated with absence of respiration, of voice-sounds, and of vibration.

The disease is either *chronic pleurisy* or *hydrothorax.*

136. As there is effusion of fluid into the pleura in

hydrothorax the physical signs are similar to those of pleurisy with effusion (114). To distinguish between these, remember that pleurisy generally affects only one, but hydrothorax both sides of the chest; that the invasion of pleurisy is sudden, attended with pain, and in the first stage it presents friction-sound, whilst hydrothorax occurs only as a part of general dropsy, or as a consequence of disease of the heart, kidneys, or liver; also that in hydrothorax you do not find the intercostal spaces obliterated or the heart displaced, as in pleurisy.

137. If you find no dulness at the lower part of the chest percuss very carefully the clavicles, the subclavicular and supraspinous regions. Compare the resonance of the corresponding regions on each side, and if you have any doubt as to the existence of dulness, percuss during a full inspiration and forced expiration. Observe also whether both infraclavicular regions expand equally during inspiration; this can be done by placing the hand on the part, or by measuring with a tape or calipers. Compare the relative lengths and the tones of the inspiratory and expiratory murmurs in the infraclavicular, supraclavicular, and supraspinous regions on either side. This you can do, either by placing the ordinary stethoscope alternately on the same region on each side, or by listening to both sides at the same time with Dr. Scott Alison's "differential stethoscope." Remark if the inspiratory sound, instead of being continuous, proceeds in a "jerking" manner, or if it be in any place "tubular;" also if after a full inspiration a slight "click" occurs at the end of it. Compare also the resonance of the voice on each side. You will generally find it useful to direct the patient to cough, and directly afterwards to draw a full breath.

138. *b.* The dulness is in the upper regions of the chest, and is attended either with feeble inspiration, increased expiration, harsh inspiration, jerking inspiration, tubular respiration, dry clicking, increased vocal resonance, lessened mobility, or diminished fulness below the clavicles.

The disease is probably *consolidation of the lung by tubercle.*[1]

139. You must not conclude that there is no tubercular consolidation because you do not at once detect the physical signs of this condition. If the general symptoms are indicative of phthisis you must examine the chest from time to time before giving a decided diagnosis.

FIG. 26.

Slight percussion-dulness; feeble inspiration; increased expiration; increased vocal resonance, &c.



Tubercle in first stage (consolidation).

a. Bronchial tube. *b.* Tubercles filling up the air-cells of the lungs.

140. The general symptoms of the first stage of tubercle in the lungs (consolidation) are cough, chiefly in the mornings, expectoration, generally small in amount, of ropy or glairy mucus, hæmoptysis, shortness of breath on exertion, general languor, pains, in the side or below

[1] Of course the physical signs of consolidation of the lung are the same, whether this arises from chronic catarrhal pneumonia alone, or, as is generally the case, combined with miliary tubercle.

the clavicles, loss of flesh, night sweats, pulse increased in frequency. Examine the gums and see if there is a red line next the teeth, also the nails if they are curved downwards at their ends (filbert nails); for both of these signs are apt to accompany phthisis. Hæmoptysis is the most suspicious symptom; if the patient is free from heart disease, and if, in the case of a female, she is not suffering from disordered menstruation, the occurrence of hæmoptysis almost always indicates the presence, or the future occurrence of tubercle in the lungs. Inquire if any other members of the patient's family have suffered from phthisis, and in all cases of doubt examine the expectoration for lung-tissue (162). Ascertain also the temperature, for if it be persistently high (102° to 103°), and no other disease likely to account for the increased heat be present, there is a great probability of tubercle.

141. *c.* The dulness on percussion is over the upper part of one or both lungs, and is accompanied by crepitation, tubular breathing, and increased vocal resonance.

FIG. 27.

Percussion-dulness; tubular breathing; crepitation; increased vocal resonance.



Tubercle in the lungs in the second stage (softening). (DOBELL.)

The *tubercle is in the stage of softening.*

142. The crepitation arises from the air passing through tubes, and minute cavities filled with fluid.

The dulness and increased vocal resonance show that the disease is not only bronchitis. In case you have only doubtful dulness, and find crepitation confined to the upper parts of the lungs, examine the sputa for lung-tissue. In this stage you can generally detect a certain amount of flattening below the clavicle, and deficient movement of one or both sides (Fig. 27).

143. Cancer of the lung presents the general symptoms of phthisis, with dulness on percussion, and tubular respiration. It is, however, usually attended with more persistent hæmoptysis, no lung-tissue can be found in the sputa, and in most cases cancer exists at the same time in some other organ of the body.

144. *d.* The dulness on percussion is over the upper part of one or both lungs, and is accompanied by tracheal sounds of the breathing (cavernous respiration) and voice (pectoriloquy), or by a splash when the patient coughs.

There is *a tubercular cavity of the lung.*

145. The tracheal sounds of the breathing and voice show that the cavity is, at least partially, empty; when there is a splash (gurgle) on coughing, the cavity contains both air and fluid (Fig. 28).

146. As phthisis progresses, the cough and expectoration increase, the emaciation becomes more rapid, the night sweats more regular and profuse. There are frequent attacks of pain in the chest or sides from pleurisy, the pulse rises in frequency, the voice is often indistinct and whispering, the tongue is covered with aphthæ, vomiting distresses the patient, especially in the morning, and swelling of the feet, and severe attacks of diarrhœa occur.

147. The physical signs of this stage are the same as when a cavity has been produced by pneumonia, which

is, however, rare. In such a case the cavity is usually at the base of the lung, and you have the history of pneumonia to guide you (109).

148. You may have the physical signs of a cavity in cases of dilated bronchus; but the general symptoms are of less severity, the physical signs indicating the ex-

FIG. 28.



Cavity of the lung opening into a large bronchial tube. *a*. Bronchial tube. *b*. Cavity.

istence of dilatations are confined to the bases of the lungs or mammary regions, the fits of coughing, although violent, are apt to recur only at long intervals, the expectoration is often of a very foul smell and contains cheesy plugs of a putrid odor, and, above all, no lung-tissues can be discovered in it with the microscope.

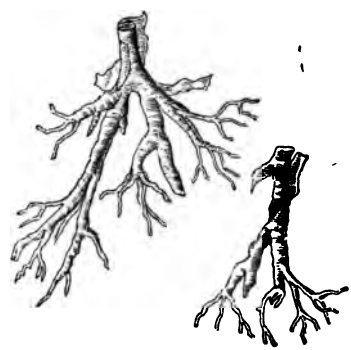
149. When a large empty cavity exists near the surface of the lung, you often have a very clear sound on percussion, and amphoric respiration and voice.

150. *B. The percussion-note is normal,* but you find the respiration accompanied by dry or moist sounds.

The disease is *chronic bronchitis.*

151. Chronic bronchitis differs from the acute form of the disease in its slower progress, and in its symptoms being less severe. When the dry or moist sounds are confined to the apices of the lungs, even if there be no dulness on percussion, you ought to suspect the presence of tubercle, and should examine the sputa for lung-tissue. Sometimes tree-like casts of the ramifications of the bronchi are expectorated. Such cases are usually very chronic, and are often attended with severe spittings of blood. This form of the disease is termed *plastic bronchitis* (see Fig. 29).

FIG. 29.



Casts of the bronchial tubes expectorated in a case of plastic bronchitis. (PEACOCK.)

152. All the *general symptoms* of phthisis may be present in chronic bronchitis (night sweats, emaciation, &c.), excepting profuse hæmoptysis; the difference in the physical signs, and the absence of lung-tissue in the expectoration, will serve to distinguish these diseases.

153. *C. The percussion-note is abnormally clear on*

both sides of the chest, the respiratory sounds are feeble and indistinct, or they may be attended with the sounds of bronchitis, or there is a prolonged and hoarse sound on expiration; the resonance of the voice is lessened, the shape of the chest is spherical or barrel-shaped, and the ribs move but slightly.

The disease is *emphysema*.

154. The heart's space is clear on percussion, and posteriorly a clear sound is elicited, even to the lowest ribs. The upper part of the hepatic region is also clear on percussion, and the liver may be often felt below the ribs on the right side, whilst the heart is pushed downwards, so that though its impulse cannot be detected in its usual place, it is seen to pulsate in the epigastrium. These changes result from the increased distension of the lungs. As bronchitis is usually also present, the auscultatory signs of this affection are generally associated with emphysema, and are most distinct at the bases of the lungs.

155. The chief symptoms of emphysema are dyspnœa, attacks resembling those of asthma, cough, and expectoration. In the later stages, dilatation of the heart often takes place, and blueness of the lips, pulsation of the jugular veins, dropsy, and other symptoms of that disease show themselves.

Section III.

THE ATTACKS OF THE DISEASE ARE ONLY OCCASIONAL.

156. Attacks of bronchitis may be occasional, but asthma is the disease usually included under this head.

157. *a*. During the attacks the percussion-note is clear, the respiratory murmur is very feeble, or mixed with rhonchus and sibilant râles.

The disease is *asthma.*

158. The attacks of dyspnœa are generally followed by bronchitis, from which the patient recovers for a time, until a fresh seizure again prostrates him. Asthma is produced by the spasmodic contraction of the muscles surrounding the bronchial tubes, the calibre of which is thus so much diminished, that the air is unable to enter the air-vesicles of the lungs.

159. The symptoms during an attack at once distinguish asthma from ordinary bronchitis. There is great tightness of the chest and intense difficulty of breathing; the patient lays hold on any steady object near him so that he may bring into play all the muscles of inspiration, the face is pallid, perspiration rolls down the brow, the pulse is weak and small, and you might even expect that death would soon take place from suffocation. The complaint often accompanies heart disease and emphysema of the lungs.

160. The spirometer is sometimes used to ascertain the state of the lungs in suspected cases of phthisis. It consists of a vessel filled with water, to which a scale is attached. When a person blows through the tube leading into it, the water is displaced, and the vessel on rising marks on the scale the number of cubic inches of air expelled from the lungs. The patient before blowing must take as full an inspiration as possible. Dr. Hutchison laid down the rule that the breathing volume for a healthy man five feet high is 174 cubic inches, and that eight cubic inches should be added to this for every inch above five feet. The spirometer is not much to be depended upon as a means of diagnosis, for the above rule is not perfectly trustworthy, and few persons can expire to their full extent without some practice.

161. The microscope is a most valuable aid in the diagnosis of phthisis—indeed, in many cases its indications are more reliable than those of auscultation and percussion. Whenever ulceration takes place in the lungs, minute particles of these organs are expelled in the sputa, and these can be separated for examination by the following method:

162. Prepare a solution of caustic soda, about twenty grains to an ounce of distilled water. Collect all the patient has expectorated in twelve or twenty-four hours, from ten at night to ten the next morning being the best period. Pour this, previously mixed and well shaken with an equal quantity of the soda solution, into a glass beaker, and boil it over a gas or spirit-lamp, stirring it occasionally with a glass rod. A test-tube does not answer so well as a beaker. As soon as it boils pour it into a conical glass and add four or five times the amount of cold distilled water. If the mucus is still gelatinous after boiling, you have either added too little soda or not boiled it sufficiently. The cold water carries down to the bottom of the glass any lung-tissues that may be present, where they form a slight deposit in about a quarter of an hour; if no deposit is visible, put the glass aside for two or three hours. Remove the deposit with a dipping-tube, place it in a glass cell,[1] cover it with a piece of thin glass, and examine it with a one-inch object glass. The lung-structures will be often found clinging to hairs and other foreign bodies present in the sputa.

163. The air-cells have the appearance presented in

[1] Proper cells and the other apparatus may be obtained of Messrs. Murray & Heath, opticians, Jermyn Street.

the accompanying drawings (Figs. 30–31) and are distinguished by the number and arrangement of the fine

FIG. 30.



Drawing of a group of air-cells as seen under the microscope.

FIG. 31.

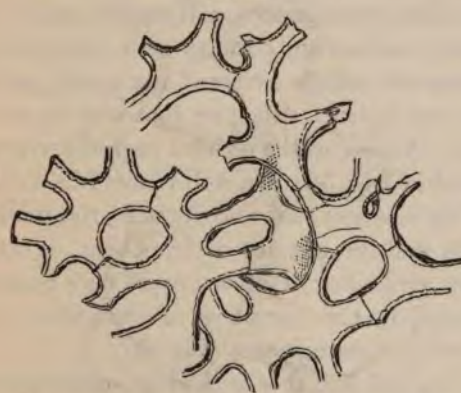


Drawing of single cells, the fibres of which are unravelled, as seen by the microscope.

fibres of which they are composed; sometimes they are

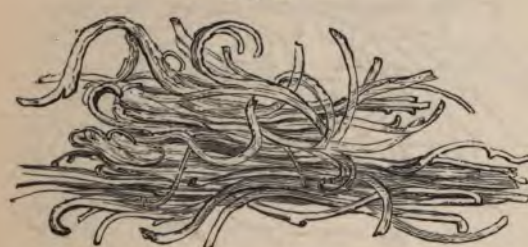
expelled in groups of twenty to thirty cells, at others only portions of single cells are visible. Bronchial tubes may be recognized by their branching form, and

FIG. 32.



Portions of vegetable structure as seen under the microscope, liable to be mistaken for air-cells.

FIG. 33.



Portions of fascia as seen under the microscope.

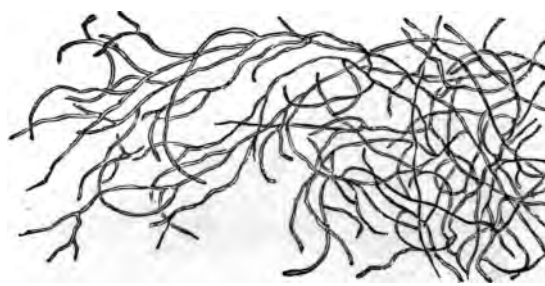
are sometimes accompanied by fragments of bloodvessels. When only small crepitations can be heard in the lungs, the greater part of the deposit will be found to consist

of air-cells; where the signs of a cavity are present you will meet with portions of the bronchial tubes in the sputa; fragments of the bloodvessels can be rarely detected excepting just before or during an attack of hæmoptysis.

164. A few examinations will enable you to recognize quickly and certainly the air-cells; but at first you must be careful not to confound them with portions of vegetable and animal structures that may be present in the sputa. A piece of the cellular part of a vegetable is represented in Fig. 32; you will observe in it the regularity of the size and shape of the cells, the thickness of their walls and the absence of fine fibres. Portions of the fibrous structures of other organs may be generally distinguished by the coarseness of their fibres and the want of cellular arrangement (Fig. 33).

165. You will find this method of examination most

FIG. 34.



Portions of fungi, often found in sputa, as seen under the microscope.

useful in acute phthisis, when other means afford you only uncertain results; in chronic catarrh and emphysema, where tubercle has been slowly developed and its

signs are masked by those of the previous disease; in that large and difficult class of cases in which the physical signs point only to bronchitis, while the symptoms indicate consumption. It is also very valuable where frequent hæmoptysis and other symptoms leave you in doubt whether you have to deal with phthisis or cancer of the lung, and it is often the only means of diagnosing with certainty a tubercular cavity from a dilated bronchial tube.

CHAPTER IV.

DISEASES OF THE THROAT AND LARYNX.

166. THE fauces are very liable to inflammation. You will meet with it in catarrh, scarlatina, phthisis, and other diseases.

167. TONSILLITIS, or inflammation of the tonsil, occurs both as an acute and chronic affection. In acute tonsillitis the gland is greatly swollen, and the neighboring mucous membrane is of a bright red color and covered with mucus. It generally terminates in abscess, which bursts into the throat.

Chronic inflammation of the tonsil is not attended with suppuration. The tonsils are often permanently enlarged. Microscopically, they present a considerable quantity of fibrous tissue in addition to an increase in their normal glandular structures. The surface of the gland is often covered with small pits containing plugs of cheesy secretion.

Cancer occasionally affects the tonsils, forming a hard swelling firmly connected to the adjoining structures.

168. DIPHTHERIA is a contagious, febrile complaint, in which the throat affection is secondary to a disease of the blood. The throat, especially the tonsils and soft palate, is coated with a thick, rough membrane of a dirty-white color, that is quickly renewed if torn off. The mucous membrane below the exudation is of a dark-red color, it seems swollen, from the inflammation affecting the substance as well as the surface of the part. Micro-

scopically, the false membrane is found to consist of cells only, closely united together. They are of different sizes, and are intimately connected with the surface of the mucous membrane on which they rest. An infiltration of newly-formed cells generally occurs into the connective tissue immediately beneath the epithelium. This may be so abundant as to compress the blood-vessels, and so give rise to gangrene.

169. Œdema of the Larynx consists in an effusion of lymph or serum, resulting from inflammation, beneath the mucous membrane of the larynx or epiglottis. It often causes death by obstructing the entrance of the air into the lungs.

170. Croup is characterized by the formation of a false membrane in the larynx and trachea, which sometimes extends into the bronchial tubes. When the membrane is peeled off, the surface looks red, rough, and swollen. *Croupous inflammation* is more generally observed in the larynx and trachea than on any of the other mucous membranes. The epithelium is stripped off at the commencement of the inflammation, and an exudation takes place that coagulates as soon as it comes into contact with the air. There is not, however, so close a union between the false membrane thus formed and the surface on which it rests, as in diphtheria. Microscopically, the false membrane is found to consist of cells intermixed with alternate layers of fibrin. The disease is often associated with bronchitis or pneumonia, is usually attributable to cold and damp, and the constitutional symptoms are secondary to the local affection.

171. The larynx is subject to acute inflammation (Acute Laryngitis), which, when it proves fatal, causes death by œdema of the glottis. When the mu-

cous membrane alone is inflamed, the disease is termed laryngeal catarrh. Chronic inflammation and ulcerations are chiefly the results of syphilis or phthisis. Tumors are not unfrequently found, generally in the neighborhood of the vocal cords (see Fig. 37).

172. STRICTURE OF THE ŒSOPHAGUS is rare, excepting as the result of cancer or aortic aneurism. In some cases ulceration is caused by the patient swallowing a corrosive fluid; when the ulceration heals, a contraction takes place which produces the stricture. Occasionally, you will find a small cancerous tumor developed in the coats of the œsophagus, but this part is generally affected with the epithelial form of cancer. In epithelial cancer you meet with an elevated, warty tumor, of irregular shape, surrounding the tube, sometimes uniting the œsophagus to the spine, at other times ulcerating into the trachea or neighboring organs.

SECTION I.

DISEASES OF THE THROAT AND ŒSOPHAGUS.

173. The chief symptoms that should induce you to suspect disease of the throat or œsophagus are pain or soreness of the throat, swelling of the glands below the jaw or in the neck, difficulty or pain in swallowing. You must examine the throat in all cases in which you suspect it to be affected, by depressing the tongue with a spoon or spatula, whilst your patient is sitting opposite a bright light.

174. *a.* You observe the mucous membrane of the throat of a red color, with or without patches of ulcera-

tion; swallowing is painful and difficult. The tonsils are not greatly enlarged, but the uvula is elongated.

The disease is *inflammation of the throat.*

175. The general symptoms vary according to the cause producing the inflammation. Thus, it may have arisen from catarrh, from the application of irritating substances, or from constitutional diseases, such as scarlatina, measles, syphilis, phthisis, or gout. In eruptive fevers, the state of the skin is sufficient to show the nature of the throat affection; syphilis is generally attended with ulcerations, round, deep, and with elevated edges, or they are superficial and irregular in shape; chronic inflammation of the back of the pharynx is a very common result of phthisis. An elongated uvula often keeps up a chronic cough.

176. *b.* One tonsil, or both, is of a red color, swollen, and tender on pressure; the uvula is enlarged, and the fauces are filled with mucus; there is great pain and difficulty in swallowing, and the patient speaks through his nose. The pulse is quick, the tongue foul, and the skin hot.

The disease is *tonsillitis* (quinsy).

177. The amount of fever varies greatly in different cases, but it is usually severe, and is often preceded by chilliness or shivering; the temperature may be 104° or upwards; the disease often terminates in suppuration, and is apt to recur from time to time. There is no fever with the *chronic* enlargement of the tonsils; the glands project into the fauces and obstruct free respiration, and it is often accompanied by deafness.

178. *c.* You see the palate, fauces, or pharynx of a vivid red color, coated in parts with a thick grayish-white exudation, which, when peeled off, leaves the sub-

jacent membrane red and bleeding, and is soon renewed. There is great depression of strength, a quick, small pulse, hot dry skin, thirst, and loss of appetite.

The disease is *diphtheria.*

179. The urine is often albuminous, sometimes bloody. The disease is ushered in with slight fever, swelling of the submaxillary and cervical glands, soreness of the throat, difficulty of swallowing, and sometimes fetor of the breath; it usually terminates in from eight to fourteen days. Sometimes the false membrane extends into the larynx and bronchial tubes, causing croup; in other cases the disease is complicated with pneumonia. Convalescence is commonly slow. Within three weeks after recovery diphtheria is apt to be followed by paralysis of the throat, face, eye, or limbs. You must be on your guard not to mistake the little patches of mucus that form on the throat and tonsils in inflammation of these parts for the false membrane characteristic of diphtheria. The former are soft and readily removed, and are not quickly renewed, as in diphtheria.

180. *d.* There is no apparent affection of the throat, but the patient is unable to swallow solid food, excepting in small morsels. A bougie passed down the œsophagus meets with an obstruction.

The disease is *stricture of the œsophagus.*

181. Stricture of the œsophagus generally comes on gradually, and is attended with great emaciation. The attempt to swallow produces pain, and usually the food is rejected immediately. Before introducing a bougie, be careful to ascertain that the symptoms are not produced by an aortic aneurism (64). In cancer you will generally find a large quantity of mucus rejected with the food, the examination of which with the microscope

may enable you to discover particles of cancerous growths.

182. Difficulty of swallowing may arise from paralysis or dyspepsia, without stricture; but the other symptoms of these diseases, and the ease with which the bougie can be passed, will prevent mistakes. In spasm of the œsophagus the symptoms come on suddenly, recur from time to time, and are generally connected with some uterine disorder.

Section II.

DISEASES OF THE LARYNX.

183. The laryngoscope is necessary for the examination of the larynx and trachea. It consists of a concave mirror, which is either fixed in a spectacle-frame, or is attached to the forehead by an elastic band, and of a smaller mirror mounted on a long handle.

184. The patient must be placed upon a chair, with a lamp on one side and a little behind him, his neck inclined slightly backwards, and the face turned a little upwards. Seat yourself opposite to him, with the concave mirror adjusted to your eye or forehead, according to the way in which it is mounted, direct him to open his mouth widely, and throw the light reflected from the mirror into the fauces, so that the centre of the disk may correspond with the base of the uvula. Grasp the end of his tongue with the thumb and forefinger of your left hand, enveloped in a fold of soft cloth or towel, gently draw it from the mouth and hold it steadily. Next warm the small or laryngeal mirror for a few seconds over the lamp, and touch your own cheek with the back

of it to prove that it is not too hot. Holding its handle in the right hand like a pen, pass it into the fauces, slightly raise upwards the uvula with its back, direct the light reflected from the concave mirror upon its surface, request the patient to draw a full breath, and then to say "ah," and you will see upon the laryngeal mirror a view of the interior of the larynx.

185. In a healthy larynx you will observe that the color of the mucous membrane is slightly red, and that the vocal cords are white. The following drawings show the various parts visible with the laryngoscope.

186. When you suspect disease of the larynx, first remark the color of the mucous membrane and if there are any ulcerations; see if there is any tumor, either in the neighborhood of the glottis or upon the vocal cords; afterwards, by directing the patient to say "ah—eh," you will be able to ascertain whether the vocal cords approximate during speech in the normal manner.

187. *a.* A child is affected with great dyspnœa, aggravated in paroxysms, rapid breathing, loud brazen cough, hoarse voice, quick pulse, thirst, and hot dry skin.

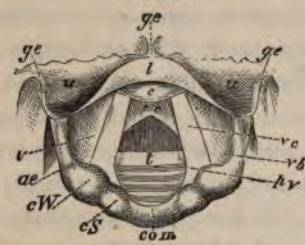
The disease is *croup*.

188. The dyspnœa arises, not only from the formation of a membrane in the larynx, but also from spasm, or, as some assert, from paralysis of the muscles of the larynx, set up by the inflammation.

189. Croup is a disease confined to childhood, and is ushered in, usually at night, by hoarseness of the voice and loud ringing cough. In fatal cases the dyspnœa increases, the respiration becomes quick and laborious, the pulse small and thready, the face pale, the lips blue; death is often preceded by convulsions. In some cases cylindrical casts of the trachea are expelled. In adults

the symptoms of croup are produced by laryngitis, but no false membrane is formed in the air-passages.

FIG. 35.



Laryngoscopic drawing, showing the vocal cords drawn widely apart, and the position of the various parts above and below the glottis during quiet inspiration.

g. e. Glosso-epiglottidean folds.
u. Upper surface of epiglottis.
l. Lip of epiglottis.
c. Cushion of epiglottis.
v. Ventricle of larynx.
a. e. Ary-epiglottidean fold.
c. W. Cartilage of Wrisberg.
c. S. Capitulum Santorini.
com. Arytenoid commissure.
v. c. Vocal cord.
v. b. Ventricular band.
p. v. Processus vocalis.
c. r. Cricoid cartilage.
t. Rings of trachea.

(DR. MACKENZIE.)

FIG. 36.



Laryngoscopic drawing, showing the approximation of the vocal cords and the position of the various parts in the act of vocalization.

f. i. Fossa innominata.
h. f. Hyoid fossa.
c. h. Cornu of hyoid bone.
c. W. Cartilage of Wrisberg.
c. S. Capitulum Santorini.
a. Arytenoid cartilages.
com. Arytenoid commissure.
p. v. Processus vocalis.

(DR. MACKENZIE.)

190. *Laryngismus stridulus* is a term applied to a spasmodic affection of the windpipe, to which young infants

are subject. The child awakes from its sleep, or is suddenly attacked when awake, with a loud crowing inspiration, which may last for several minutes, and then disappear as rapidly as it came on; in other cases death occurs during the attack from suffocation. It is a nervous disorder, and is liable to be excited by various causes of irritation acting on the nervous system. It most frequently occurs in children who are teething, and in those brought up by hand. It is readily distinguished from true croup, by the suddenness of the attack and by the absence of cough and fever.

191. *b.* The mucous membrane of the larynx, or a portion of it, is abnormally reddened, and presents small ulcerations in different parts. The patient complains of hoarseness or loss of voice, cough, and expectoration.

The disease is *ulceration of the larynx.*

192. Inflammation of the mucous membrane of the larynx may occur as an acute or chronic affection. It often results from catarrh, but its most severe forms are met with in persons suffering from phthisis. It may present itself in the early stages, but it usually occurs towards the close of the disease, and adds greatly to the sufferings of the patient. In other cases ulceration is the result of syphilis. Whenever, therefore, you meet with chronic laryngeal catarrh, examine the chest and ascertain if there be any history of syphilis.

193. *c.* You find a red, semi-transparent swelling of the epiglottis, or of the ary-epiglottic folds.

The disease is *œdema of the glottis.*

194. Œdema may exist as an acute or chronic affection of this part. When chronic it is most frequently caused by disease of the cartilages; in either case its symptoms are distressing, and its issue often fatal. There

are generally present intense dyspnœa, hoarseness or loss of voice, harsh, barking cough, and difficulty of swallowing. The inspiration is loud and noisy, whilst the expiration is tolerably easy. The symptoms of œdema are very similar to those of croup, but croup usually attacks children who are in good health, or are recovering from eruptive fevers; œdema takes place chiefly in adults who are already the subjects of laryngeal diseases. In croup you often see patches of false membrane on the throat; in œdema you can almost always feel with the finger the erect and swollen epiglottis. If you are able to employ the laryngoscope the diagnosis is made still more certain.

195. Various forms of tumors occur in the larynx, chiefly in the vicinity of the vocal cords; they are usually of a warty or fibroid character (see Fig. 37), in other cases they arise from hypertrophy of the mucous follicles.

196. *d.* One vocal cord, or both, is motionless, and remains stationary at the side of the larynx when the patient attempts to speak, although the parts seem otherwise normal. The voice is lost, or whispering.

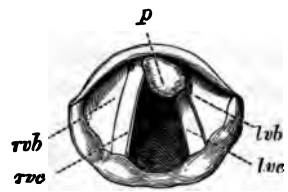
The disease is named *aphonia.*

197. If both of the vocal cords are unable to be drawn to the median line of the larynx when the patient attempts to speak, the complaint arises from paralysis of the *adductors* of the vocal cords (crico-arytenoidei laterales, and the arytenoideus proprius). This condition usually arises from debility or hysteria, but in other instances it is the result of phthisis or catarrh. When only one cord moves in the attempt to speak, the crico-arytenoideus lateralis of the opposite side is palsied. The most common causes are lead-poisoning, syphilis, diphtheria, or phthisis, but

occasionally it results from disease of the brain (see Fig. 38).

198. *e.* The patient suffers from great difficulty of breathing, increased on the slightest exertion, and one

FIG. 37.

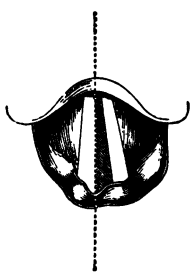


A small polypus attached just above the anterior insertion of the vocal cord.

r. v. b. Right ventricular band.
r. v. c. Right vocal cord.
l. v. b. Left ventricular band.
l. v. c. Left vocal cord.
p. The tumor.
(DR. MACKENZIE.)

or both of the vocal cords remain motionless when a full inspiration is taken.

FIG. 38.



The appearance presented in a case of paralysis of the adductor of the left vocal cord, when the patient attempted to speak. The left vocal cord was not adducted to the median line; consequently a space remained between the vocal cords, and the voice could not be sounded. (DR. MACKENZIE.)

The disease arises from *paralysis of the abductors of the vocal cords*—(crico-arytenoidei postici).

199. It is rare to find the abductor muscles of both sides paralyzed, but it does occasionally occur in disease of the brain. When one side is alone affected, the disease is usually the result of the compression of the recurrent nerve by an aneurism, or a tumor of a glandular or cancerous nature.

FIG. 39.

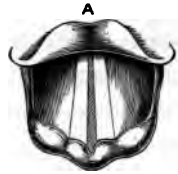
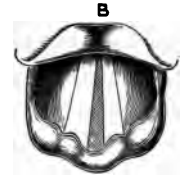


FIG. 40.



The appearances presented in a case where the abductors of both vocal cords were paralyzed.

A. Inspiration. B. Forced expiration.

(DR. MACKENZIE.)

200. The voice may be lost or greatly altered in tone by paralysis of the tensors (crico-thyroidei), or of those whose office it is to relax the vocal cords (thyro-arytenoidei). In the former case the surface of the cords seems to be not quite horizontal and the edges are not perfectly straight; in the latter a minute elliptical opening may often be discovered between the cords.

CHAPTER V.

DISEASES OF THE KIDNEYS.

201. THE chief diseases to which the kidney is liable are congestion, pyelitis, suppurative nephritis, acute and chronic Bright's disease, fatty and lardaceous degenerations, dilatation, tubercular and cancerous diseases.

202. CONGESTION OF THE KIDNEY.—The organ is of a dark-red color, is much increased in size; the structure is tough when the congestion has been of long standing. On a section being made blood flows freely from it, and its substance, as well as the mucous membrane of the pelvis and calyces, is much congested. Microscopically, the toughness is found to arise from an increased growth of connective tissue, which chiefly occurs in the cortical part. Congestion of the kidney generally arises from disease of the heart or lungs, or from some other cause preventing the ready return of the venous blood from the organ.

203. In PYELITIS, or inflammation of the mucous membrane of the pelvis and calyces of the kidney, the membrane is red, thickened, sometimes ulcerated, and covered with muco-purulent secretion or with pus. It is generally caused by the irritation of a stone in the kidney, the extension upwards of inflammation of the bladder or urethra, the accumulation and decomposition of urine in the pelvis, or by tubercular deposits in the mucous membrane. It is apt to give rise to dilatation

of the kidney, and it is usually present in all cases of dilated kidney.

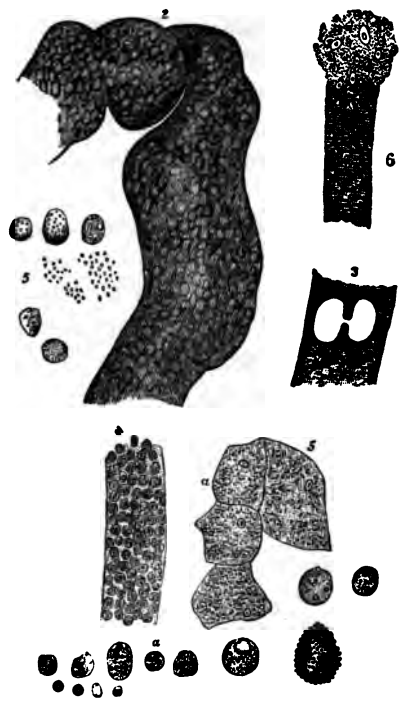
204. SUPPURATIVE NEPHRITIS, or inflammation of the substance of the kidney terminating in suppuration, is a rare disease, excepting as the result of some affection of the bladder or urethra, of pyæmia,[1] or of inflammation set up by a calculus. The morbid appearances are those of congestion, attended by deposits of pus, chiefly in the cortical part. It is generally accompanied by pyelitis.

205. ACUTE TUBULAR NEPHRITIS, or ACUTE BRIGHT'S DISEASE.—The kidney is much increased in size and weight, its capsule is readily removed; in some cases the organ is of a deep red color, but in others of a light yellow, or the surface is irregularly congested and displays here and there minute red spots or patches. The surface of a section may be of a dusky red, studded with red spots, or the cortical part may be pale and the pyramids red and striated. Microscopically, the tubes are filled with large and *granular* epithelial cells, intermixed with and cemented together by fibrin and blood-corpuscles. The contents of the tubes, when washed away by the urine, constitute the fibrinous and cellular casts characteristic of the disease (Fig. 43). The capsules of the Malpighian bodies are sometimes filled with blood; in other cases the Malpighian bodies appear dense and granular, whilst their capillaries are greatly congested. This complaint not unfrequently gives rise to chronic Bright's disease. It is usually the result of scarlatina or exposure to cold.

[1] A febrile affection produced by the entrance of pus into the blood, and resulting in the formation of abscesses in the viscera and other parts.

206. CHRONIC NEPHRITIS.—Much confusion has arisen from various disorders of the kidney having been

FIG. 41.



Showing the tubes of the kidney in chronic tubular nephritis. 2. Cortical tube, distended with epithelium, and bulged in a good part of its extent. 3. Cortical tube, containing a dumb-bell crystal of large size. 4. Cortical tube, distended with epithelium; at *a*, below it. some of the separate cells are shown more highly magnified. 5. Bulky epithelium from cortical tube; the group at *a* are remarkably enlarged, those below them are more or less fatty. 6. Medullary tube much distended, the contents are seen escaping from the upper end. (JONES and SIEVEKING.)

described under the name of "Bright's disease." At least four different forms of chronic disease appear to

have been thus confounded, viz., chronic tubular nephritis, or as it is called by others, chronic desquamative nephritis, fatty kidney, lardaceous kidney, and intertubular nephritis, or granular kidney. In all of these albumen and casts of the urinary tubules are found in the urine. All forms of Bright's disease, whether acute or chronic, are apt to give rise to dropsy, which is an effusion of the serum of the blood into the subcutaneous areolar tissue (œdema), or into the cavities of the body. This is supposed to take place, either from the blood being altered in its composition through the retention of various excrementitious substances (urea, &c.), which the kidneys, when healthy, remove, or from an excess of water arising from its insufficient excretion in the form of urine. The former of these conditions gives rise to uræmic poisoning, of which convulsions and apoplexy are the most serious consequences.

207. CHRONIC TUBULAR NEPHRITIS, often called the LARGE WHITE KIDNEY.—The organ is much increased in size, the capsule peels off readily, the surface is white and smooth, with patches of a red color or arborescent veins upon it. On section, the cortical part is seen to be much increased in volume, is of a pale-yellow color, and markedly striated; the pyramids are often congested. Microscopically, the tubes are dilated and greatly distended with cells, fatty and granular materials; at a later stage they lose their lining membrane, and become atrophied; the Malpighian bodies are more opaque than usual, and are usually enlarged (see Fig. 41).

208. FATTY KIDNEY presents morbid appearances similar to those of chronic tubular nephritis; but on microscopic examination, fatty matters are found in

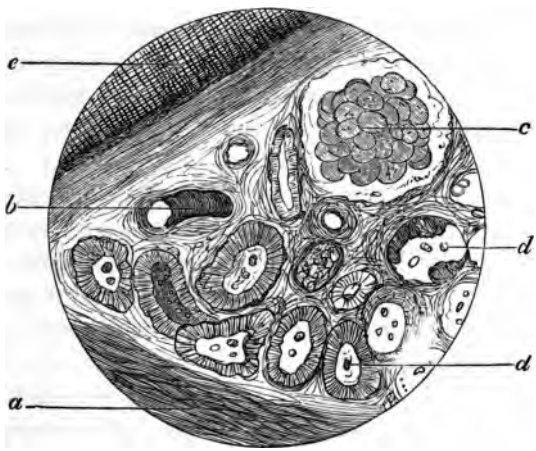
great quantity in the cells of the tubes, and upon the capillaries of the Malpighian bodies. The color of the whole gland is generally very pale.

209. LARDACEOUS, AMYLOID, or WAXY KIDNEY.—The kidney is usually large and hard, and its capsule is readily stripped off. On section it has a more or less translucent, waxy, bloodless appearance; a solution of iodine stains the tissues of a reddish-brown color. Microscopically, the smaller arteries are generally thickened, the morbid change first affecting the Malpighian bodies and their afferent vessels. This disease is usually associated with a similar condition of the liver and spleen in persons affected with phthisis, syphilis, caries of the bones, or other wasting disorders. The excretion of urea is less interfered with in this than in the other forms of Bright's disease.

210. INTERTUBULAR NEPHRITIS, GRANULAR, or CONTRACTING KIDNEY.—The whole organ is much reduced in size, the capsule is thickened, adheres firmly, and on being peeled off, leaves portions of its tissue on the exterior of the gland. The surface is irregularly covered with small prominences; in other cases *cysts* are apparent. On a section being made, the cortical part is seen to be much reduced in thickness, and the whole structure is dense, tough, coarse, and fibrous. Microscopically, in the earlier stages the connective tissue is very vascular and infiltrated with cells, which are afterwards converted into fibrous tissue. The pressure exerted by this new-formed tissue upon the adjoining parts produces atrophy of the Malpighian bodies and shrinking and distortion of the renal tubes, which are often found devoid of epithelium. The arteries are generally thickened and dilated. In some cases cysts

exist in such numbers that the whole organ seems to be composed of them. They seem to originate in the expansion of small portions of the uriniferous tubes which

FIG. 42.



Section of a kidney affected with intertubular nephritis, as seen under the microscope. *a*. Capsule much thickened. *b*. A small artery with thickened coats. *c*. Malpighian body. *d*. Tubes wholly or partially lined with epithelium. The tubes are seen to vary greatly in size and shape, being compressed by the thickened fibrous tissue situated between them. *e*. Large artery much thickened.

have become blocked up, or in dilated Malpighian bodies.

211. DILATATION OF THE KIDNEY.—In an extreme degree of this disease the organ is much increased in size, is lobulated, and seems as if converted into a bag containing pus or urine. When the sac contains pus the disease is named *pyonephrosis*, whilst the term *hydronephrosis* is applied to it if it is filled with a watery urine. The kidney may be so much enlarged from its conversion into cysts, as to form an abdominal tumor.

On a section being made of a dilated kidney, the cortical part may be so greatly atrophied that it can be scarcely recognized, the medullary portion is compressed and flattened, the pelvis and infundibula are dilated, and their lining membrane is raw and congested from the accompanying pyelitis. The disease is produced by the flow of urine being obstructed by a calculus, or by some affection of the ureters, bladder, or urethra; in other cases it results from tubercular affection of the pelvis of the kidney.

212. TUBERCULAR DISEASE OF THE KIDNEY.—In some cases, the deposits exist in the form of small scattered tubercles in the cortical part of the gland along with general tuberculosis; in others there are gray or yellow nodules in the cortical part which soften and open into the infundibula, or the whole organ may have been destroyed, and after death you find the capsule inclosing a putty-like mass of tubercular matter intermixed with the scanty remains of the original structures. The disease occasionally commences by tubercular deposits in the pelvis of the kidney. Tubercular disease of the kidney is very often associated with a similar affection of the testicle and prostate gland.

213. CANCER OF THE KIDNEY is chiefly of the medullary kind. It generally begins in the neighboring lymphatic glands, and often forms a tumor in the abdomen of large size, especially in children.

214. The symptoms that should lead you to suspect disease of the kidneys are, anæmia, dropsy, vomiting in the early morning, attacks of bronchitis, diarrhœa, frequent micturition at nights, intractable indigestion, or convulsions. Indeed, as most of the diseases of this organ are unaccompanied by pain, it will be advisable

for you to ascertain the state of the kidneys in any case in which the symptoms are obscure or threatening. The urine supplies you with the best means of determining if the kidneys are healthy; you should, therefore, practice yourself in the examination of it as carefully as in auscultation and percussion.

215. Observe the color of the urine, whether it is of lighter or darker tint than usual, or if it is tinged with blood or bile.

216. Ascertain its specific gravity; float a urinometer in it, and observe what number on the scale is on a level with the upper surface of the liquid. The urinometer is so constructed that it floats with the index at zero when placed in distilled water. The specific gravity of healthy urine is from 1015 to 1025. If you multiply the last two figures of the specific gravity by 2, you obtain a rough estimate of the amount of solid materials in the urine: thus, if you have 1000 grains of urine with a specific gravity of 1020, that amount will probably contain 40 grains (20×2) of solid matter. But as the density of the urine varies greatly at different periods of the day, it will be necessary to collect all that has been passed in twenty-four hours, before you can arrive at any trustworthy conclusions on this point.

217. Test for the presence of albumen. Boil about a drachm of the urine in a test-tube, having previously added ten or fifteen drops of nitric acid; if albumen is present the fluid becomes opaque. Observe the proportion of albumen when it has fallen to the bottom of the tube; as, for instance, about one-quarter or one-sixth of the liquid examined. The opacity is most readily seen by inclining the test-tube, partially filled with the suspected urine, over the spirit-lamp, so that the *upper*

layer is first heated. Heller's plan is to pour some nitric acid into a test-tube, and then allow the urine to flow gently down the side of the tube, so that the liquids may meet without mixing. At their point of junction an opaque layer is visible if albumen be present. In testing for albumen it is the safest plan to use both the heat and nitric acid. Heat alone often fails to produce coagulation when the urine is alkaline, and the presence of only a drop or two of the nitric acid tends to hinder rather than assist coagulation. On the other hand, a cloudy appearance often takes place in boiled urine from the precipitation of phosphates, which disappears on the addition of an acid. Nitric acid alone sometimes causes turbidity by the precipitation of uric acid, in other cases by the formation of crystals of nitrate of urea.

If you find albumen, begin at (220).

218. If you do not find albumen, next test for sugar. Pour into a test-tube a small quantity of the urine, add to it a few drops of a dilute solution of sulphate of copper, and about half as much liquor potassæ as urine. If sugar be present, the precipitate first formed is redissolved, and the liquid assumes a dark-blue color. When boiled, a *reddish-brown precipitate* of oxide of copper will be deposited, and the same change will occur if the fluid be allowed to stand for twenty-four hours without being heated. If the urine contain albumen, this must be first separated by filtration after coagulation by heat and nitric acid, for the presence of albumen prevents the precipitation of the oxide of copper.[1]

[1] In testing for sugar it is often more convenient to use Dr. Pavy's solution than the liquor potassæ and sulphate of copper. The solution consists of sulphate of copper 320 grains, tartrate of potash (neutral) 640 grains, caustic potash 1280 grains, distilled

If you find sugar, pass on to (258).

219. Although neither albumen nor sugar be present, you may still derive much information from a further examination of the urine; pour a portion of it into a conical glass, leave it at rest for a few hours, so that any precipitate that may form may have time to subside to the bottom of the glass, and then pass on to (262).

Section I.

YOU FIND THE URINE ALBUMINOUS.

220. You must not conclude that the patient has a disease of the kidneys, because you find albumen in the urine, for this may arise from fever, gout, cholera, pregnancy, and many other conditions; but if, *after frequent examinations*, you find albumen, pus, or blood; or if, along with the albumen, there are "tube-casts" in the urine, and the general symptoms of kidney disease are well marked, you may safely diagnose a morbid state of the urinary organs.

221. To examine the urine for casts of the uriniferous tubes, pour it into a conical glass, and set it aside for a few hours; remove with a dipping-tube a small quan-

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water 20 fluid ounces. The tartrate of potash and caustic potash are to be dissolved together in one portion of the water, and the sulphate of copper alone in the other; the two solutions are then to be mixed. Boil a small quantity of this solution in a test-tube, and add to it a little of the suspected urine, drop by drop, until you have used rather less than an equal quantity of the solution. If sugar be present, an intense opaque yellow color is formed; if no such precipitate has taken place when the liquor has become cold, the urine is not saccharine.

tity of the deposit at the bottom of the vessel, place it on a slide, or, what is better, in a shallow cell, cover it with a piece of thin glass, and examine it with a microscope. You can detect casts of the tubes with a one-inch object-glass, but a quarter inch objective will better enable you to study their characters.

222. The casts appear under the microscope as solid moulds or long narrow tubes; they are formed by the coagulation of the fibrin of the blood in the uriniferous tubes, which, when washed away by the urine, carries with it portions of the epithelium. Thus you may judge, to a certain extent, of the conditions of the secreting part of the kidney by the appearances presented by the casts.

223. There are four principal forms of casts.

1. *Transparent hyaline*, or *waxy casts*, in which there is no trace of structure. They vary greatly in diameter, from $\frac{1}{300}$th to $\frac{1}{50}$th of an inch, and probably vary also in chemical composition. These, as represented in 3, Fig. 43, may easily escape observation; they are best brought into view by throwing the light upon them obliquely, or by adding a drop of a watery solution of iodine to the specimen.

2. *Cellular casts* are covered by the epithelial cells of the uriniferous tubes, as at *b*, Fig. 46. Their presence shows that the tubes are still lined by epithelium, and that the disease is recent. The cells are usually granular and opaque.

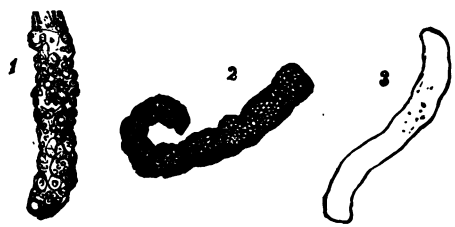
3. *Granular casts* have a dark granular appearance, and are usually about $\frac{1}{700}$th of an inch in diameter. They are produced in tubes whose epithelium is undergoing disintegration (see 2, Fig. 43). In many recent cases you may meet with casts granular from the deposition

upon them of urate of ammonia, but they become transparent when warmed.

4. *Casts loaded with fat*, or covered with cells containing fatty granules, if *numerous and persistent*, generally indicate fatty degeneration of the kidney (see 1, Fig. 43). Even in recent cases you often see a *few* casts rather oily.

224. Sometimes you find blood, or even pus-cells, entangled in the tube-casts. The size of the casts varies

FIG. 43.



Drawings of casts of the tubules of the kidney. 1. Oily cast in fatty degeneration of the kidney. 2. Dark granular cast in chronic nephritis. 3. Small waxy cast. (BEALE.)

according to the part of the kidney in which they have been formed, and with the state of the lining membrane of the tubes. If the epithelium be abnormally adherent, the cast will be small; if it be detached, the cast will be, of course, larger. The epithelium of the bladder, ureters, and pelvis of the kidney is apt to present itself in the urine, whenever inflammation exists in these parts. The appearance of these cells is so similar to that of cancer-cells, that it may readily give rise to a mistake in diagnosis.

225. Instead of finding casts the deposit may consist of pus. You detect pus, either by adding to the deposit liquor potassæ, which converts it into a thick, glairy

mass, or by examination with the microscope. Pus-cells are round, $\frac{1}{2000}$th to $\frac{1}{3000}$th of an inch in diameter, and have a granular appearance. When acetic acid is

FIG. 44.

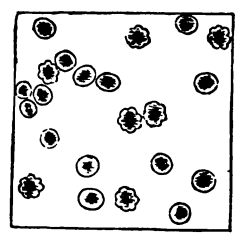


Pus-cells as seen under the microscope. (BOWMAN.)

added they become transparent, and display from one to four circular nuclei. If the deposit is formed of pus pass on to (240).

226. The deposit may consist of blood, or the urine may be colored with blood and deposit a substance of a brownish-red color formed of fibrin. After remaining

FIG. 45.



Blood-corpuscles in urine; some have an irregular outline. (BOWMAN.)

long in urine blood-corpuscles often have a ragged, irregular outline; they are about $\frac{1}{3000}$th part of an inch in diameter, and have no nucleus. If there be blood pass on to (247).

A. The urine is albuminous and contains tube-casts.

227. *a.* Inquire if the disease is recent, or of long duration; if recent it is *acute tubular nephritis:* if chronic pass on to (231).

228. *a. a.* The urine is scanty, high-colored, of high specific gravity, very albuminous, smoky, sometimes bloody, or deposits a dirty brown sediment; the tube-casts are cellular, or transparent, and mixed with blood-cells and particles of fibrin. The patient has dropsical swellings of the body, face, and limbs, a quick pulse, thirst, and dry skin.

The disease is *acute tubular nephritis* (*acute Bright's disease*).

229. This form of Bright's disease is generally ushered in with chilliness or shiverings, followed by

FIG. 46.



Drawing of a red deposit from urine in acute tubular nephritis. *b*. Fibrinous casts covered with renal epithelium. (JONES and SIEVEKING.)

headache, thirst, nausea or vomiting, and swelling of the face and limbs and pains of the loins. It usually arises

in children from scarlatina, in adults from exposure to wet and cold. It is frequently complicated with inflammation of the pleura, pericardium, or peritoneum. The presence of blood shows that the affection is recent and the congestion severe. Combined with the dropsy you will generally find cough and dyspnœa. Convulsions are not unfrequent. If inflammation of other organs takes place, the symptoms of such affections are of course superadded. Recovery is often accompanied by the passing of large quantities of urine.

230. You must remember that attacks of acute tubular nephritis often occur during the course of the more chronic forms of Bright's disease: you must, therefore, in all cases, carefully inquire into the history of the affection, before deciding that the complaint is recent. Acute tubular nephritis often becomes chronic, and then presents the symptoms of chronic Bright's desease.

231. *b.* The chronic diseases under this head are chronic tubular nephritis (large white kidney), fatty kidney, lardaceous kidney, and intertubular nephritis (granular degeneration).

232. *a. a.* The urine is not diminished in quantity, is generally of low specific gravity and is albuminous, the tube-casts are mostly granular, or transparent; there is œdema of the body and limbs, and anæmia.

The disease is *chronic tubular nephritis* (*chronic desquamative nephritis*).

233. In some cases you may detect enlargement of the kidney in the loins. This is most easily done whilst the patient is resting on his hands and knees, or lying on his face. This form of disease seldom occurs in persons above forty-five years of age. The pallor of the lips and skin, and the swelling of the face and limbs,

will at once arrest attention, and enable you to guess at the nature of the disease before you examine the urine. The dropsy is an early symptom and begins in the feet, eyelids, and ankles. The complaint is usually accompanied either by bronchitis, hydrothorax, disordered digestion, vomiting in the early morning, or diarrhœa. The patient is liable to inflammation of various organs; therefore, if there be any increased heat of skin or other symptoms indicative of inflammation, carefully examine the state of the heart and lungs with the stethoscope.

234. *b. b.* If, in addition to the albuminous state of the urine, and the general symptoms of disease of the kidney, you find *numerous* casts loaded with fat, or a quantity of free oil, you may diagnose *fatty kidney.*

235. *c. c.* If with pale and very albuminous urine of low specific gravity (1005 to 1015) you find a few casts, mostly of the large waxy form, in a person who suffers from diarrhœa, or has diseased bone or phthisis, or enlarged liver or spleen, or has suffered greatly from syphilis, you may suspect the disease to be *lardaceous kidney.*

236. *d. d.* The urine is pale, increased in quantity, of low specific gravity, and albuminous. The tube-casts are mostly large, granular, or waxy. The patient is thin, pallid, feeble, and suffers from dyspepsia, dyspnœa, and from some œdema of the legs. The skin is harsh and dry.

The disease is *granular kidney* (*intertubular nephritis*).

237. This form of disease progresses more slowly than those before described, and occurs chiefly in older persons or in those subject to gout. As the kidney becomes less able to perform its functions other organs are

implicated. Thus you will meet with affections of the retina, paralysis, hypertrophy of the heart, bronchitis, or dropsy. Early in the disease the urine may be free from albumen, but it is increased in quantity, and contains a few tube casts, the patient loses flesh and strength, and is troubled with vomiting and dyspepsia. Dropsy is much less common than in chronic tubular nephritis, in which it is almost always present.

238. Granular kidney is mainly distinguished from the other forms of chronic Bright's disease, by the paleness and increased quantity of the urine, by its low specific gravity (often below 1010) and the small amount of albumen it contains; by the disease occurring chiefly in middle-aged or old persons, and in those who have suffered from, or are hereditarily predisposed to gout, by the slowness of its course, the frequent absence or small amount of dropsy, and its association with neuro-retinitis, hypertrophy of the heart, or cirrhosis of the liver.

Lardaceous kidney is characterized by a large quantity of pale urine of low specific gravity, by the small number of tube-casts, by its association with diarrhœa and phthisis, or its occurrence in persons who have suffered from syphilis, diseased bone, or other wasting diseases. Dropsy is uncommon unless chronic tubular nephritis is also associated with it.

239. Uræmic poisoning is apt to occur in all the above forms of kidney disease, because the elimination of the solid parts of the urine (urea, &c.) is lessened. It generally shows itself by headache, or a feeling of weight or tightness in the forehead, dimness of sight, or confusion of memory. Convulsions may come on suddenly, or the patient may be attacked with apo-

plexy. In other cases intense difficulty of breathing occurs from œdema of the lungs, or the patient is prostrated by severe vomiting, or diarrhœa, or signs of acute inflammation of the pleura, pericardium, or peritoneum, present themselves.

B. The urine is albuminous, contains no tube-casts, and deposits pus.

240. You may often find, with the aid of the microscope, a few pus-corpuscles in the urine of persons in perfect health, or you may see them entangled in the tube-casts in cases of acute or chronic nephritis. I here allude only to such a deposit of pus as is evident to the eye of the observer.

241. The pus may result from inflammation of other parts of the genito-urinary organs than the kidneys, or from abscesses bursting into them. If the patient is a female, ascertain if she suffers from leucorrhœa, or any other affection of the uterus or vagina. In the male, the urethra, prostate, or bladder, may be in fault. Inquire if he has been affected with stricture of the urethra, or stone in the bladder, if there is frequent desire to pass urine, or difficulty in so doing, also if there is tenderness in the perineal or hypogastric regions. If you can find no evidence of disease in the uterus, vagina, bladder, or urethra, the pus probably proceeds from the kidney.

242. *a.* The two diseases of the kidneys capable of producing pus in the urine are both chronic, and are,—pyelitis, with or without dilatation of the kidney, and tubercle of the kidney.

243. *a. a.* Together with the deposit of pus in the urine, you can feel a fulness, or a smooth immovable tumor in the lumbar region; there is tenderness on

in the lungs. The kidney may be enlarged, but it is not generally so. Sometimes hæmaturia is the earliest symptom. As tubercular disease occasionally leads to dilatation of the kidney, it is advisable to examine the state of the lungs whenever pus exists in the urine. The presence of a yellow, cheesy matter, insoluble in acetic acid, in the urine, is by many considered an indication of the presence of tubercle. This disease is so often associated with a similar condition of the prostate gland and testis, that these organs should be always examined when you suspect it.

C. The urine contains albumen, but no casts, and deposits blood, or is tinged with it.

247. You must first satisfy yourself with the microscope that the coloring matter is really that of blood; a somewhat similar color may arise from the patient having taken beetroot, logwood, &c. In the female, blood is often found in the urine from affections of the uterus or vagina; in the male, from those of the prostate and bladder. When it comes from the bladder the blood is not generally diffused through the urine, but is chiefly passed towards the termination of micturition, and is apt to form clots. Having, then, first ascertained that there is no disease of other organs likely to produce bleeding, and remembering that in nephritis the blood is entangled in or accompanied by tube-casts, inquire if the disease is recent (248), or of long duration (251). The absence of tube-casts shows that the secreting portions of the kidney are unaffected. Remember that *hæmaturia*, as the passing of blood in the urine is termed, may arise from the patient having taken irritating medicines, such as turpentine, &c.

The coloring matter of the blood may be present in

urine when no blood-corpuscles can be detected. This may occur in jaundice, typhoid fever, and other diseases. In order to ascertain if blood is present, we are recommended to add acetic acid to the urine, and boil it, when a reddish-brown coagulum will be formed, which becomes almost black when dried.

248. *a.* The only recent diseases of the kidneys likely to produce this symptom are the passage of a stone down the ureter and intermittent hæmaturia.

249. *a. a.* The patient suffers excruciating pain in the loin and down in the direction of the ureter, with numbness of the thigh and retraction of the testis; there is no fever, but usually vomiting; the urine is passed frequently, is scanty, bloody, or albuminous.

The symptoms are probably due to the *passage of a calculus down the ureter.*

250. The pain is not always felt in the back, but sometimes in the sacrum or abdomen. It usually ceases directly the stone reaches the bladder. This disease is most likely to be confounded with colic, the passage of a gallstone, or with lumbago. The suddenness of the attack, the severity of the pain, and the alteration in the urine, distinguish it from the latter. You should inquire if the patient has previously experienced any similar illness.

251. *b.* The chronic diseases capable of producing hæmaturia, without tube-casts, are, rheumatic, typhoid, and other fevers, purpura, scurvy, stone in the kidney, cancer of the kidney, intermittent hæmaturia. I need only mention the occurrence of blood in the urine of persons affected with fevers, purpura, and scurvy, to put the student on his guard against mistaking this symptom in such cases for one of disease of the kidney.

252. *a. a.* The urine is bloody and albuminous, chiefly after exertion, the patient suffers from severe pain in the back, hip, thigh, or testis; the pain varying in degree at different times.

The disease is probably *stone in the kidney.*

253. Stone in the kidney may give rise to pyelitis with or without dilatation of the organ (243), or the calculus may escape into the bladder. The symptoms vary according to the effects it produces. Inquire if any gravel or small calculi have been previously passed; also ascertain if the urine contains crystals of lithic or oxalic acid, or epithelial cells from the pelvis of the kidney. Nausea and vomiting are often present, and many patients suffer from irritabiliiy of temper or mental depression.

254. *b. b.* The urine almost constantly contains blood; the patient suffers from severe pain in the loins, and a liability to attacks of vomiting; he is thin, pale, sallow, and feeble; a tumor can be felt in the lumbar region.

The case is *probably cancer of the kidney.*

255. The diagnosis is generally difficult. If there is a tumor in the lumbar region, you have to distinguish between cancer and dilated kidney. Cancer is much more rapid in its course, and is attended with greater loss of flesh and strength; in the latter the urine usually deposits pus instead of blood, and the size of the tumor often varies in proportion with the amount of pus discharged. When you suspect cancer, examine the liver, in order to ascertain if it is enlarged with cancerous tumors. In the latter stages of cancer you often have dropsy of the legs and abdomen, and occasionally portions of cancerous structure can be detected in the urine;

but remember that the normal epithelial cells of the pelvis are not unlike some forms of cancer-cells. Most of the cases of cancer of the kidney attended by hæmaturia occur in persons above fifty years of age.

256. *c. c.* The patient suffers from occasional attacks of hæmaturia without apparent cause; the general health is unaffected, and the urine generally contains oxalates. There is no tumor in the lumbar region.

The disease is probably *intermitent hæmaturia.*

257. In most of these cases the attacks have been attributed to cold, but many seem to be connected with gout or ague. Along with the blood there is generally a large quantity of lithic or oxalic acid crystals. Hæmaturia is a common complaint in some countries, as at the Cape of Good Hope, and these often seem to depend on the presence of a parasite (*Bilharzia hæmatobia*) in the kidneys.

Section II.

YOU FIND THAT THE URINE CONTAINS SUGAR.

258. There is only one disease under this head, viz., *diabetes.*

It is found that the presence of chloride of ammonium, *urate of ammonia,* or other ammoniacal salts, in the urine prevents the successful application of the copper test, if the amount of sugar is small. In any doubtful case you must have recourse to one of the following tests:

Mix a small portion of German yeast in the urine contained in a test-tube, close the open end of the tube with a small dish, and invert them. Pour a little more

of the urine into the dish, and if any air has entered the tube, mark with ink the exact height at which the liquid stands. Set aside the tube for twenty-four hours in a warm place, and if sugar be present, gas will be given off from the urine, and will rise to the summit of the tube.

Or, the urine is diluted with an equal quantity of a solution of carbonate of soda (1 to 3), and a little subnitrate of bismuth is added to it. After boiling for some time, the bismuth will be reduced and deposited as a black powder, if sugar be present.

259. *a.* The urine contains sugar, it is pale, of a straw color, of high specific gravity (1030–1050), has a faint smell, and is passed in large quantities. The patient has lost flesh and strength, complains of great thirst, sinking at the stomach, he has a dry, harsh skin, pains of the back and limbs; the appetite is voracious, and the bowels are usually confined.

The disease is *diabetes.*

260. You must examine the urine more than once, with an interval between the examinations, because the presence of the sugar may be only temporary, or it may have arisen from some improper article of diet. Never give an opinion as to the disease without satisfying yourself by careful chemical testing that sugar is present; for there is an excessive quantity of urine secreted in diabetes insipidus, in chronic intertubular nephritis, in hysteria, and other disorders. The quantity of urine passed daily in diabetes varies from 8 to 30 pints, or even more; from 1 to 2½ pounds of sugar may be thus discharged in the twenty-four hours. The disease comes on gradually, and the patient often complains of thirst, weakness, and loss of flesh before he observes the increase in the amount

of urine. It is often accompanied by boils or carbuncles, swelling of the legs, sometimes by cataract; the patient usually dies of consumption or apoplexy. The sugar frequently disappears from the urine shortly before death.

261. *Diabetes insipidus* is characterized by the passing of a large quantity of clear, colorless urine, of low specific gravity (1003 to 1007), devoid of sugar and albumen. The complaint is usually attended with thirst, dry, harsh skin, and feebleness of body and mind.

Section III.

YOU FIND A DEPOSIT IN THE URINE.

262. Observe whether the urine you placed in the conical glass remains clear or has deposited a sediment. If there is a deposit, pass a piece of glass tube, the upper end of which is closed by your forefinger, to the bottom of the glass, raise the finger for a moment so as to allow a small quantity of the deposit to rise in the tube, close again the end of the tub, and place a drop of the deposit, thus obtained, on a clean glass slide, cover it with a piece of thin glass and examine it with the microscope, a $\frac{1}{2}$ or $\frac{1}{4}$-inch object-glass being best fitted for the purpose. When you wish to ascertain the effects of reagents on the deposit, place a drop near the covering glass and watch the results.

263. In perfectly healthy urine you may have a slight cloudy deposit of mucus, and on examining this with the microscope, you will generally find epithelial cells from the bladder and urethra. Those from the bladder are flat and scaly, from the urethra columnar (see Fig. 47).

264. In diseases of the kidneys you often have a quantity of epithelium from the renal tubes. These cells are small, round, or polygonal, and have a well-defined nucleus. The epithelial cells from the ureters

FIG. 47.

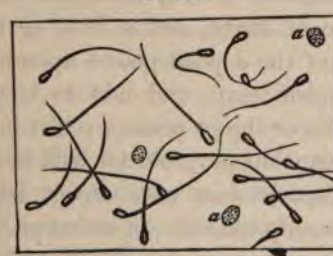


Scales of epithelium as seen under the microscope. (BOWMAN.)

and pelvis of the kidney are of the columnar form, and often adhere in small pieces.

265. In some cases spermatozoa are present. They are oval in form, with long delicate tails, and require a

FIG. 48.



Spermatozoa and spermatic granules, magnified 400 diameters.

¼-inch object-glass for their detection. It is only when numerous and constantly passed that they can be looked upon as indicating disease (see Fig. 48).

266. In examining a urinary deposit, observe whether it is composed chiefly of crystals, or is granular and amorphous. If crystalline, begin at (267); if amorphous, pass on to (277).

A. *The deposit consists of crystals.*

267. The crystals generally met with are those of lithic acid, oxalate of lime, triple phosphate, and cystine.

268. *a.* The deposit is red, and in grains not unlike cayenne pepper, under the microscope the crystals are reddish, or yellow rhombic plates, like lozenges (Fig. 49).

FIG. 49.



Different forms of uric acid crystals as seen under the microscope. (BOWMAN.)

They are composed of *uric acid* (*lithic acid*).

269. In case of doubt, add a drop or two of nitric acid to a little of the deposit placed upon a glass slide; dry it over a spirit-lamp, and add to it when cold a drop of ammonia or liquor potassæ: if it is composed of lithic acid, a beautiful purple color will be produced.

270. This deposit does not, except when in large quantity, necessarily indicate an *excess* of uric acid, for it is thrown down in any normal urine, when an acid is added to it. When the amount is large and constant it is associated with an increased acidity of the urine; it is therefore present in a number of different disorders, such as indigestion, rheumatism, gout, fevers, &c. If the de-

posit occurs *directly* after the urine is passed, you may suspect a tendency to the formation of uric acid stones in the kidney.

271. *b.* Microscopically, the crystals are octahedral (like envelopes), or dumb-bell shaped, and of various sizes. (Figs. 50, 51.)

FIG. 50.



Octahedral oxalate of lime crystals. (BOWMAN.)

FIG. 51.



Dumb-bell shaped crystals of oxalate of lime. (BOWMAN.)

They are composed of *oxalate of lime.*

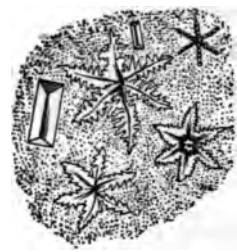
272. This deposit is usually scanty, and looks to the naked eye like mucus. The crystals are insoluble in acetic acid or liquor potassæ, but dissolve in dilute nitric acid. It is very common to find oxalate of lime crystals in small numbers in the urine of healthy persons, and a deposit of them may be produced by certain articles of food, such as rhubarb. When numerous and persistent they generally indicate irritability of the nervous system and feeble digestion.

273. *c.* The crystals are in the form of transparent prisms, or feathery bodies. (Fig. 52.)

They are composed of *triple phosphate.*

274. These crystals are soluble in acetic acid. They are associated with a neutral, or alkaline state of the urine, and may be produced by the decomposition of the

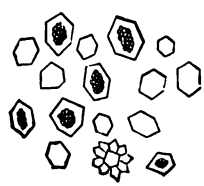
FIG. 52.



Forms of triple phosphate crystals. (BOWMAN.)

urine set up by the mucus secreted by a diseased bladder. When there is no local cause for their production, they generally indicate a feeble state of the system.

FIG. 53.



Crystals of cystine. (BOWMAN.)

FIG. 54.



Cystine crystallized from an ammoniacal solution. (BOWMAN.)

275. *d.* The crystals are six-sided plates, very sparingly soluble in hot water, but readily so in ammonia, and are deposited unchanged upon the spontaneous evaporation of the solution.

They are composed of *cystine.* (Figs. 53, 54.)

276. The ammonia is used to distinguish cystine from lithic acid, the latter being deposited in a *granular* form from its solution in ammonia.

B. *The deposit is amorphous.*

277. The substances likely to form the deposit are pus, urate of soda or ammonia, and earthy phosphate. Add to the deposit in a test-tube half its bulk of liquor potassæ, and shake it briskly.

278. *a. Pus* is distinguished by the microscope (Fig. 44), and forms a glairy mass when shaken with liquor potassæ.

279. *b.* The deposit dissolves in liquor potassæ.

It is formed of *urate of soda, ammonia, or lime.*

280. The urates are the most common of the urinary deposits, and are of very slight clinical importance. They indicate that the urine is acid and concentrated, and they are most readily deposited in cold and damp weather.

281. *c.* The deposit does not dissolve in liquor potassæ.

It is formed of *earthy phosphate.*

CHAPTER VI.

DISEASES OF THE LIVER.

282. THE principal diseases to which this organ is liable are—simple enlargement, acute hepatitis, abscess, acute atrophy, cirrhosis, hydatid tumors, cancer, and fatty and lardaceous degenerations. In addition to these, we have to consider inflammation of the hepatic ducts, dilatation of the gall-bladder, and biliary calculi.

283. SIMPLE ENLARGEMENT OR CONGESTION OF THE LIVER.—The liver is liable to three forms of congestion. 1. *Passive congestion*, arising from an obstruction to the flow of the blood into the heart. 2. *Active congestion*, from too large a quantity of blood entering the organ. 3. A state in which the ducts become gorged with bile. In the two first forms the whole organ is enlarged, smooth on the surface, of a dark-red color, its anterior margin hard and prominent; if cut into, blood flows freely from the section. When congestion has been maintained for some time, "nutmeg-liver" is produced. In this state the liver presents, on section, the appearance of a nutmeg, viz., red spots or patches, surrounded by spaces of a yellowish or dirty-white color. Microscopically, in passive congestion the hepatic veins are much dilated and their walls thickened. By the pressure of the enlarged veins upon the surrounding parts, the cells in the interior of the lobules are reduced in size, and are of a dark-yellow color, whilst those on the exterior are large, pale, and fatty. In some cases the

cells in the centre of the lobules are absorbed, and only dark-colored granular matter remains.

The most common causes of passive congestion are valvular diseases and dilatation of the heart, emphysema and other diseases of the lungs, which obstruct the flow of the venous blood through the right side of the heart (see Fig. 3). *Active* congestion is generally the result of intermittent fevers, or immoderate eating or drinking. The bile-ducts become gorged when any circumstance, such as a stone in the duct, prevents the flow of bile into the intestine.

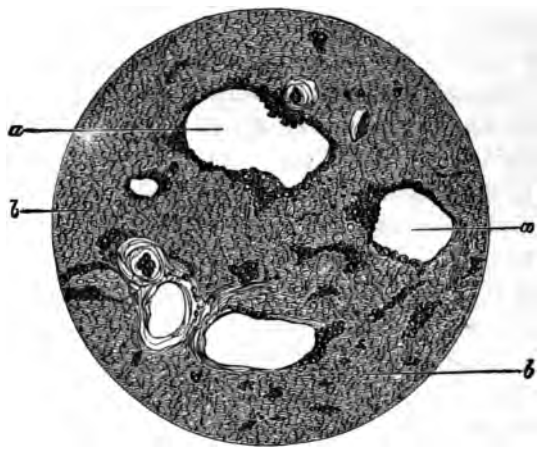
284. Acute Hepatitis, or acute inflammation of the liver, although rare in this country, is not uncommon in tropical regions; the only form in which you are likely to meet with it is abscess. Abscess usually presents itself in this country either in connection with disease of the colon, or as the result of pyæmia. In the former case the abscess is usually single and of large size, and the pus may be surrounded by an uneven, ragged boundary of softened hepatic tissue, or it may be inclosed by a thick, tough membrane. When it results from pyæmia, a number of small abscesses occur in the course of the portal veins. An hepatic abscess, when single, generally presents itself in the right lobe. It may point externally, or may burst into the peritoneum, into the chest, or into some part of the intestinal canal; or the pus may dry up, and leave a cheesy mass of white, dry matter.

285. Thickening of the Capsule of the Liver (Perihepatitis), is the result of inflammation, and is usually accompanied by adhesions to some of the neighboring organs. It may occur along with general peritonitis, or it may result from the irritation set up by

an abscess of the liver, or by a cancerous or hydatid tumor.

286. In ACUTE ATROPHY the liver is much reduced in size, it is of a greenish-yellow color, and is soft and flaccid in texture. Microscopically, the lobules cannot be distinguished from one another, the hepatic cells have vanished, and are replaced by a confused mass of pigment, granular matter, and oil-globules (see Fig. 55).

FIG. 55.



A section of the liver in a case of acute atrophy, as seen under the microscope. The divisions between the lobules have disappeared, and the whole structure seems to be composed of granular and fatty matters. *a*, points to the intra-lobular veins, the openings of which, on account of the softness and atrophy of the texture, are seen to be very large, of an irregular shape, and very close to each other. A few fatty cells can still be seen at different points, (*b*.)

In the early stage of the disease there appears to be an exudation around the lobules, which compresses the smaller branches of the biliary ducts. The spleen is usually enlarged. Crystals of tyrosin and leucin are found both in the liver and the urine, and sometimes in

the blood of the hepatic veins (see Figs. 60, 61). The cause of this disease is unknown, but most pathologists look upon it as a variety of acute hepatitis.

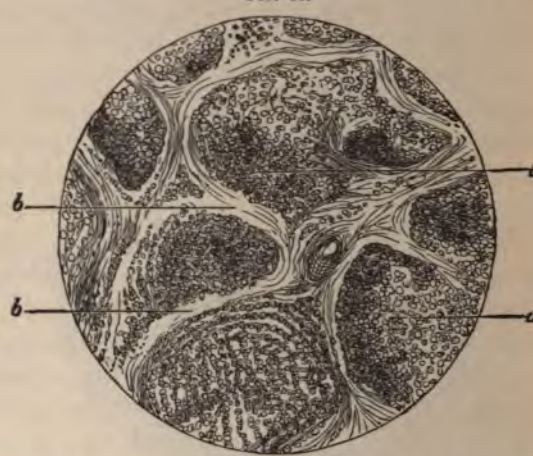
287. Cirrhosis or Chronic Hepatitis is a form of chronic inflammation, in which the fibrous covering of the liver and the connective tissue which accompanies the vessels into the interior of the organ become thickened, and thus atrophy of the secreting substance is produced. The liver is hard, tough, and leathery, and is generally much reduced in size, especially the left lobe, which is often shrivelled into a mere membranous appendage. The capsule is opaque and closely adherent, and when torn away, often shows the surface of the organ to be covered with protuberances of different sizes ("hob-nail liver"). Microscopically, the main portion of the structure is formed of connective tissue produced by inflammation around the portal canals. By the shrinking of this new-formed tissue the lobules are compressed, the liver cells become fatty, or are absorbed and disappear. The branches of the hepatic artery are often enlarged, and ramify in the thickened structure, but the ramifications of the portal vein are compressed and in many cases obliterated. The protuberances on the surface are formed of groups of lobules isolated and constricted by the new-formed connective tissue (see Fig. 56).

In the early stage of the disease the liver is usually enlarged; it is also enlarged when cirrhosis is combined with fatty or lardaceous degeneration. From the compression exercised on the ramifications of the vena portæ in the liver the whole of the bloodvessels of the portal system become engorged. Hence the serum exudes into the cavity of the peritoneum, causing dropsy (ascites), the spleen is generally increased in size, and the mucous

membrane of the stomach and bowels is so much congested that severe hemorrhages often take place.

288. Hydatid Cysts (Parasitic Disease) occur more frequently in the liver than in any other organ, and often attain an enormous size. The whole liver appears enlarged; the increase in size is not uniform, however, but is greatest near the part affected by the cyst.

Fig. 56.

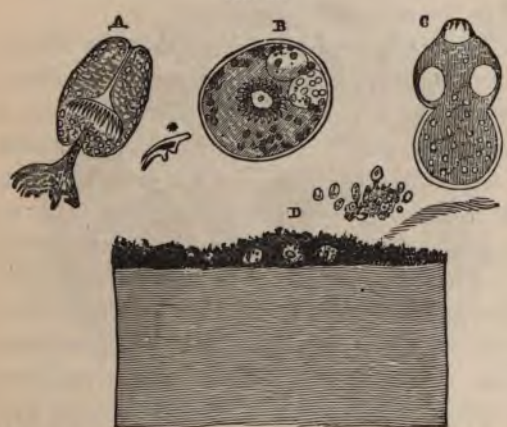


Section of the liver in a rather early stage of cirrhosis, as seen under the microscope. *a*. Lobules of the liver, the cells being in a state of fatty degeneration. *b*. Newly formed connective tissue between the lobules, originating in inflammation of the portal canals, and compressing both the vessels and the secreting structures.

The structure of the organ is healthy. The lining membrane of the cyst is soft and gelatinous, and contains a clear fluid, and usually other smaller cysts, which vary greatly in size and float in the fluid. The cyst is surrounded by, but does not adhere to, an envelope of condensed areolar tissue, that is closely connected with the hepatic tissue. Attached to, and growing from the

lining membrane of the cyst are minute bodies, which, on microscopic examination, are seen to be oval in shape, and to possess a head surrounded by a crown of minute calcareous hooks (Fig. 57). In some cases the hydatid dies and is converted into a putty-like mass, which you can distinguish from the remains of an abscess by finding amongst its contents the hooklets of the "echinococci," as these minute animals are named. Hydatid cysts are

FIG. 57.



A. Echinococcus, the head retracted. B. Echinococcus, the head and coronet of hooks facing the observer. C. Echinococcus, the head extruded. D. Section of wall of the cyst, in the lining membrane of which are seen several Echinococci. (JONES and SIEVEKING.)

developed from the ova of a tapeworm (*Tænia echinococcus*), which probably enter the veins from the intestines, and thus find their way to the liver.

289. The FATTY LIVER is uniformly enlarged, and has round edges, feels greasy, is pale in color, and soft in texture. Microscopically, the hepatic cells are filled

with oil, and their nuclei are obscured, or have disappeared. In the earlier stages the cells on the exterior of the lobules, where the ramifications of the portal vein are distributed, are alone affected, but as the disease progresses the morbid change spreads also to the centre of the lobules.

The disease is generally found in connection with phthisis, or some other wasting disorder. It is supposed that the fat is absorbed from the tissues of the body, which are rapidly undergoing disintegration, and is deposited in the cells of the liver.

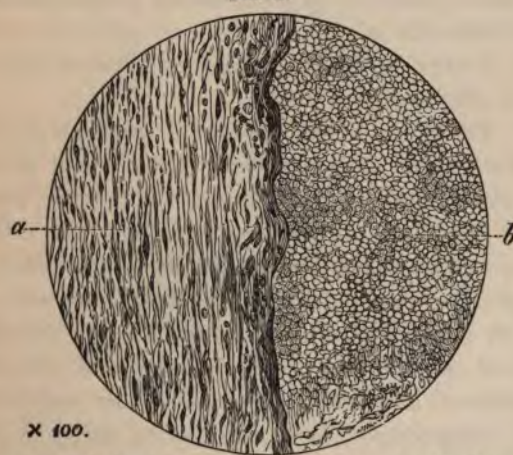
290. LARDACEOUS LIVER, AMYLOID or WAXY DEGENERATION, depends on the presence of a substance in the coats of the smaller bloodvessels and in the secreting cells, that becomes of a blue color when treated with iodine and sulphuric acid. It was supposed from this reaction that the morbid material was of a starchy nature, but it is now known to be a modification of fibrin. The whole organ is uniformly enlarged, it is very heavy, firm, smooth, and pale on the surface. A section is dry and bloodless, and has a translucent appearance. A solution of iodine, alone, gives a reddish-brown color to the tissue. Microscopically, the cells are very coherent, their granular contents are seen to be replaced by a clear substance, the nucleus is invisible, and the walls of the smaller bloodvessels are hard and thickened. The cells in the middle of the lobules are first affected, because the ramifications of the hepatic artery are chiefly distributed there; afterwards, the morbid change spreads towards the centre of the lobule. In other organs also the walls of the smaller arteries first afford evidence of amyloid degeneration.

The disease is sometimes associated with fatty degen-

eration, and it generally occurs along with a similar condition of the spleen or kidneys, in persons who have suffered from scrofula, affections of the bones, syphilis, or phthisis.

291. SYPHILIS often affects the liver, giving rise to well-defined tumors, of a yellowish-white color and firm consistence. They are usually situated on the external part of the organ, extending from the capsule

FIG. 58



Section of a syphilitic tumor of the liver, as seen under the microscope. *a*. Margin of the fibrous part of the tumor where the development of the fusiform cells into fibres is seen. *b*. The softer cellular part of the structure. The line dividing these two parts has been engraved much too distinctly.

inwards. Microscopically, the external part of the tumor consists of fibres, whilst the softer structure towards the centre presents to the view cells, granular and fatty matters, and, in some cases, plates of cholesterin (see Fig. 58). Of the internal organs syphilis chiefly affects the liver, brain, testis, and kidney.

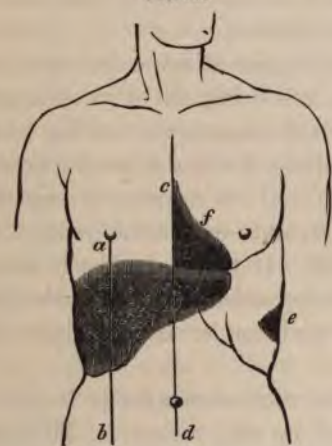
292. CANCER OF THE LIVER is rare as a primary affection, but is frequently met with as the result of malignant disease in other organs. In *medullary* cancer the liver is usually much enlarged by growths from the parts affected. In *scirrhus*, hard, slightly projecting nodules are scattered through the organ. *Colloid* and epithelial cancers are very rare, and seem only to occur as an extension of disease from other parts. Cancer of the liver usually produces ascites, and very frequently gives rise to jaundice, by compression of the bile-ducts. Local peritonitis is almost always set up in the vicinity of the tumors, producing adhesions between the liver and the neighboring organs.

293. The GALL-DUCTS and GALL-BLADDER are liable to inflammation and malignant disease, and thus we meet with thickening, ulceration, and other morbid changes in them. If the free passage of the bile has been prevented, the gall-bladder becomes distended, and may attain a considerable size. Gallstones are often found in the gall-bladder after death; they are chiefly composed of cholesterin (usually 80 to 90 per cent.), bile-pigment, and earthy matters. They vary in size from a hempseed to a hen's egg; when only one exists in the gall-bladder it is round or oval; but when there are many, they usually present smooth, flat surfaces, from their friction on each other.

294. The symptoms that should lead you to suspect an affection of the liver are: pain, or a feeling of weight, in the epigastrium, right side or shoulder, pale-colored stools, jaundice, vomiting, flatulence, dropsy of the legs or abdomen, or hemorrhage from the stomach or bowels. You should also always examine the state of this organ in cases of disease of the heart and kidneys.

295. You ascertain the size and shape of the liver by percussion, auscultatory-percussion, and by palpation. Trace the upper border first, and mark the outline with ink, beginning where the sound is clear, and continuing downwards until you bring out a dull note. You will remark that, before you find the sound *quite dull*, there is a portion where, from the upper edge of the liver

FIG. 59.



Area of hepatic dulness, viewed anteriorly, *a—b*. Right mammary line. *c—d*. Median line. *e*. Splenic dulness. *f*. Cardiac dulness. (MURCHISON.)

being covered by a thin layer of lung, the sound is more resonant than that just below it.

Both borders of the liver are curved; the upper partially dull line extends from the tenth or eleventh dorsal vertebra behind to the seventh intercostal space on a line with the centre of the axilla, and to the fifth intercostal space on a line with the right nipple, from which the dulness is prolonged to the apex of the heart. The

lower border corresponds, below the right nipple, with the lower margin of the ribs; in the epigastrium it generally extends two or three inches below the junction of the sternum with the lowest costal cartilage (see Fig. 59). To define the upper border percuss strongly; at the lower, press the finger or pleximeter firmly down, and strike lightly. You will often find auscultatory percussion of great use in defining the lower border. Whenever the liver is diseased, ascertain also the dimensions of the spleen.

296. You will gain valuable information by feeling the liver when it is enlarged. Place the patient on the left side, with both knees bent, and the back supported by a pillow. Slide the tips of your fingers or the edge of your hand from below upwards beneath the lower edge of the liver, and instruct the patient to draw a full breath. In this way you will often be able to examine both the inner and outer surfaces of the organ, and to detect any projections or irregularities that may be present.

297. Jaundice often accompanies disease of the liver, and is produced by the presence of bile-pigment in the blood. The yellowness is seen in the skin, conjunctivæ, and urine. In some diseases the color of the skin simulates jaundice, but in the latter alone has the conjunctiva a yellow tinge. As the urine may be colored by other substances, you should test for the presence of bile with nitric acid. Pour a little of the urine on a white plate, and drop into it a small quantity of nitric acid; if bile-pigment be present a play of colors will appear round the acid—brown, green, violet, red, and yellow.

298. Jaundice may be caused either by the absorption of bile from the liver, or by the retention and decompo-

sition in the blood of substances, that, in a healthy state, are secreted by that organ. Absorption of bile occurs whenever the hepatic or common ducts are greatly narrowed or completely closed by a gallstone, the pressure of a tumor, a plug of mucus, or by inflammatory swelling of the mucous membrane; or again, when any of the larger ducts within the liver are compressed, either by vascular congestion, or other causes. The second form of jaundice occurs in pyæmia, acute atrophy, and other febrile diseases. When the common duct is closed the stools are white, since no bile can enter the intestine, but in the second form of jaundice, they are not altered in color. The condition of the heart, kidneys, and right side of the chest should be always ascertained when jaundice is present.

299. First inquire if the disease has begun suddenly or gradually. If suddenly, begin at (300); if the appearance of the symptoms has been gradual, pass on to (313).

Section I.

THE DISEASE HAS COMMENCED SUDDENLY.

300. Under this head you have acute congestion, abscess of the liver, jaundice arising from obstruction of the common gall-duct, and acute atrophy of the liver. In the first three the area of hepatic dulness is increased; in acute atrophy it is diminished.

301. *a.* You find the liver increased in size, a little tender, and smooth on its surface. There are pain or weight in the right side, pain in the right shoulder, slight jaundice, headache, nausea or vomiting, the tongue is

foul, there is loss of appetite, and the bowels are usually confined; there is little or no fever.

The disease is *acute congestion of the liver*.

302. This affection is often the result of disease of the heart, but it may be also produced by blows on the side, ague, and the abuse of alcoholic stimulants. It not unfrequently precedes or accompanies cirrhosis, and other disorders of the liver. Always examine the right lung in these cases, for very similar symptoms accompanied by jaundice sometimes present themselves in pleuropneumonia.

303. *b*. In addition to the signs of acute congestion, you find considerable pain and tenderness on pressure over the liver, vomiting, often urgent, shiverings, profuse sweats during sleep, thirst, quick pulse, and emaciation. Sometimes delirium is present.

The disease is probably *abscess of the liver*.

304. Abscess of the liver occurs either singly as the result of acute inflammation, or as the consequence of pyæmia, when there are generally numerous deposits of pus. The former in this country is rarely met with, excepting in those who have lived in the tropics and have suffered from dysentery. When a single abscess is present you may have bulging, tenderness, and obscure fluctuation over some portion of the liver, but in other cases you have no physical signs, and the symptoms may be absent or so obscure that you can only guess at the nature of the disease. The pyæmic form usually results from external injuries and surgical operations, or from some internal abscess or ulceration. It may arise from ulcers of the stomach, intestines, or pancreas.

305. *c*. You find yellowness of the skin, and conjunctivæ, the urine is yellow and often deposits a thick sedi-

ment, the stools are pale, the heat of skin is not increased, the pulse is not quick, and there are no head symptoms; there is increased dulness over the site of the gall-bladder.

The disease is *jaundice from obstruction of the common gall-duct.*

306. Jaundice is attended with emaciation, flatulence, loss of appetite, and other signs of indigestion; there is usually drowsiness, and itching of the skin is a very common symptom. This form of jaundice may arise from the duct being closed by a gallstone, by inflammation of the duct itself, or by tumors pressing upon it. Consequently the jaundice may be temporary, or permanent, and it may occur during the progress of other hepatic diseases. The liver is often uniformly enlarged from the congestion of the bile-ducts; its surface is smooth.

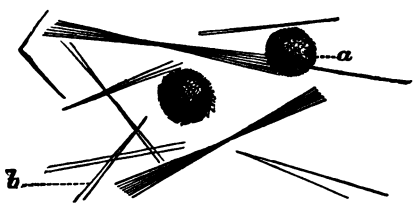
307. When the jaundice arises from a gallstone it is preceded by very severe pain, aggravated in paroxysms, referred to the gall-bladder or right scapula. During the paroxysms, the face is pale and covered with sweat, the pulse slow, and the pain is not increased by pressure; vomiting of an acid fluid often takes place. The pain generally terminates suddenly, and jaundice occurs a day or two afterwards. In such cases the stools should be well mixed with water and strained through muslin, so that any calculus that may have been passed may be discovered. Gallstones are most common in persons of middle, or advanced age, and are more frequent in females.

308. If the closure of the gall-duct has arisen from inflammation of the mucous membrane extending from the stomach and duodenum, the jaundice is preceded by

tenderness of the epigastrium, bilious vomiting or diarrhœa, white tongue, and loss of appetite. When repeated attacks of jaundice, unaccompanied by other disease of the liver, occur in a young person, they usually depend on inflammation of the ducts; when in one of middle or advanced age, on the irritation excited by gallstones.

309. In some cases the gall-bladder, from long dis-

FIG. 60.



Crystals of tyrosin obtained by the evaporation of urine. (FRERICHS.)

FIG. 61.



Crystals of leucin. (BEALE.)

tension, forms a pear-shaped tumor extending downwards. It is most likely to be mistaken for a hydatid tumor, but its situation, the presence of jaundice, and the probable history of gallstones, cancer, or other disease of the liver, will serve to distinguish it.

310. *d.* You have jaundice, *attended with diminution of the area of hepatic dulness*, pain in the epigastrium,

vomiting, often of blood, restlessness, delirium, or coma, rapid pulse, high temperature of the skin, thirst, dry brown tongue, and hemorrhages from the nose, stomach, bowels, or uterus, or extravasations beneath the skin. The urine generally contains leucin and tyrosin.

The disease is *acute atrophy of the liver.*

311. The complaint is generally ushered in with headache, nausea, vomiting, foul tongue, and rapid pulse. It is usually fatal, and is most common during pregnancy. It ordinarily runs its course within a week.

312. Tyrosin and leucin are found by evaporating the urine, when, if present, they form crystals which can be detected by the microscope. Tyrosin forms needle-shaped crystals, arranged in bundles or stellate groups; leucin occurs in laminated crystalline masses (see Figs. 60 and 61).

Section II.

THE DISEASE HAS COMMENCED GRADUALLY.

313. First ascertain if the area of dulness of the liver is increased or diminished. If enlarged begin at (314); if it is smaller than in its normal state, or is attended with dropsy, pass on to (328). In all cases examine and mark out the size of the spleen.

A. The liver is increased in size.

314. In this case, ascertain whether there be pain and tenderness on pressure, if so, pass on to (322); but if there is neither pain nor tenderness, begin at (316).

315. I must caution you against certain errors to which you may be liable in estimating the size of the liver. Sometimes its lower edge is ill-defined from im-

paction of fæces in the colon. Auscultatory-percussion will usually prevent your making a mistake in this particular, but if you have any doubt, the colon should be emptied by an enema or purgative. Or the liver may be pushed downwards by pleurisy, emphysema, dilated heart, distended pericardium (see Fig. 5), or by the use of tight stays or belts. To diagnose pleurisy with effusion from enlarged liver, remember that the upper border of the dulness in pleurisy is plane, not arched, and that the liver is not depressed on forced inspiration. Where tight-lacing has been practiced, you will generally find some external evidence of it.

a. You find the liver increased in size, but there is neither pain nor tenderness on pressure. Under this head you have fatty liver, lardaceous liver, and hydatid tumor. In the first two the enlargement is *uniform*, in the third it is irregular in shape.

316. *a. a.* There is no pain in the right hypochondrium or epigastrium, the liver is *uniformly* enlarged, feels smooth and rather soft, but is not tender on pressure; the spleen is not enlarged; there is neither jaundice, dropsy, nor albumen in the urine; the patient is usually feeble and liable to diarrhœa.

The disease is probably *fatty liver.*

317. This affection most commonly occurs in persons laboring under phthisis, in drunkards, in patients who have suffered much from syphilis or other exhausting diseases. Perhaps its chief characteristic is the absence of all symptoms leading to suspicion of hepatic disorder.

318. *b. b.* There is a feeling of fulness in the right hypochondrium, the liver is *uniformly* enlarged, it feels hard and smooth, but is not tender on pressure; the spleen is enlarged, jaundice is rare, but dropsy of the ab-

domen is often present; the urine is copious and generally contains albumen; the patient is pale and anæmic, and is liable to nausea, vomiting, and diarrhœa.

The disease is probably *lardaceous degeneration of the liver.*

319. This malady generally occurs in persons who have suffered greatly from syphilis, scrofula, disease of the bones, or phthisis, or in those who have had long-continued suppuration from other causes. The condition of the spleen and urine are the most important points in the diagnosis, and it should be remembered that the lardaceous attains a greater volume than the fatty liver. In some syphilitic subjects the shape of the enlarged liver is not quite uniform, being divided by one or more deep cicatrices.

320. *c. c.* There is no pain or tenderness on pressure, but the liver is enlarged, *not uniformly*, but it presents a swelling or tumor at some parts of its area. The tumor is smooth, elastic, and sometimes gives a peculiar vibration to the fingers on percussion. There is no enlargement of the spleen, jaundice, nor dropsy, and the patient's general health is unaffected.

The disease is probably *hydatid tumor of the liver.*

321. If not relieved by treatment, the tumor may cause death by bursting through the diaphragm, or into the peritoneal cavity, or it may evacuate its contents through the gall-ducts or some part of the intestinal canal. It may be confounded with abscess of the liver, enlarged gall-bladder, or cancerous tumor. The history and the absence of constitutional symptoms distinguish it from abscess; the jaundice, site of the tumor, and perhaps a history of previous colic, serve to diagnose the enlarged gall-bladder; whilst malignant disease will be

recognized by the irregularity of the surface of the tumor, the pain and tenderness, and the rapid loss of flesh and strength that accompany it, and often by the presence of cancer in some other organ of the body.

b. You find a chronic enlargement of the liver, attended with pain in the right hypochondrium or epigastrium, and tenderness on pressure.

322. Under this head are chronic congestion, abscess, cancer, and cirrhosis when attended with fatty or amyloid degeneration (287). You may meet with *jaundice* in all of these, and with the exception of chronic congestion, the outline of the organ is in all apt to be *irregular*. Dropsy is usually present in cirrhosis, and often also in cancer of the liver.

323. Chronic congestion presents the same symptoms as when it is acute (301), but they are generally less severe; it results from diseased heart, ague, or the abuse of ardent spirits. Although acute hepatitis begins suddenly (303), yet an abscess produced by it may remain for a length of time. In such a case you will find enlargement with irregularity in the shape of the liver, and pain and tenderness on pressure; but, besides the history of the disease, your diagnosis will be assisted by the presence of fever, shiverings, sweatings, and emaciation.

324. *a. a.* There is severe pain in the right hypochondrium or epigastrium, with tenderness on pressure. The liver is enlarged, its shape is irregular, and the edge or the surface is uneven; the spleen is seldom enlarged, but jaundice, and dropsy both of the abdomen and legs, are frequently present. The patient is sallow, feeble, and emaciated.

The disease is *cancer of the liver*.

325. In three-fourths of the cases there is also a can-

cerous tumor of some other organ, usually of the breast, uterus, or stomach, and the glands of the neck are often affected. It rarely occurs below forty years of age, and the patient usually dies within twelve months. The jaundice, when present, is commonly produced by the pressure of enlarged glands upon the common bile-duct.

326. Cancer of the liver is most liable to be mistaken for amyloid disease, hydatids, or cirrhosis. In amyloid degeneration the progress is slow, there is no pain nor tenderness, the spleen and kidneys are generally affected, and there is a history of caries of the bones, constitutional syphilis, or long-continued suppuration. When the cancer is of a medullary character, it may be confounded with hydatid tumor, but the smoothness of the surface, and the absence of pain and constitutional symptoms, will enable you to diagnose the latter affection. The enlarged stage of cirrhosis will be recognized by the smaller amount of pain, the slowness of the progress, the absence of other malignant tumors, and the history of tippling. When jaundice arises from malignant disease, the color of the skin is frequently of a very deep yellow, tending to a greenish-brown.

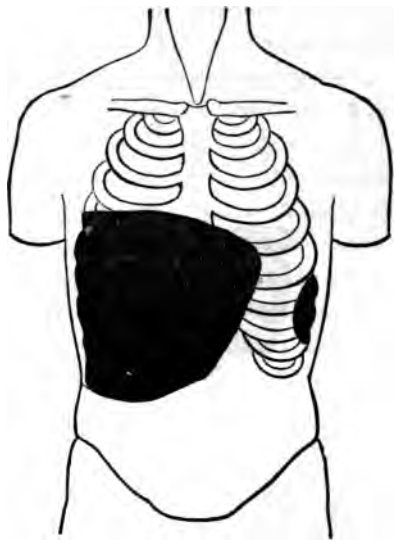
327. You may also divide the enlargements of the liver into two chief groups: one where the organ is uniformly increased in size, the other comprising those in which the shape is irregular.

B. The liver is diminished in size.

328. Before concluding that the liver is diminished, you must bear in mind the possibility of mistakes through the following conditions: The stomach and colon may be so much distended that you are unable to mark out the lower edge of the liver, or a portion of intestine may lie across and conceal it. If the lower

border is very thin, and you percuss strongly, the resonance of a portion of gut below it may deceive you as to its actual size. Again, in some cases the front of the liver is puckered up by cicatrices, whilst the posterior part is enlarged. In all doubtful cases you should lay the patient on his face, and mark out the organ from behind, as well as laterally, and in front.

FIG. 62.



Shows the diseases in which the liver is uniformly enlarged.
(MR. S. MACKENZIE.)

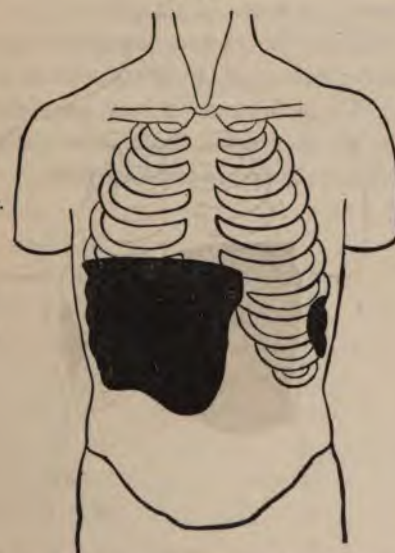
329. *a*. The area of hepatic dulness is diminished, especially over the smaller lobe; if the lower border can be distinguished, it feels rough and irregular. There is usually ascites, and the superficial veins of the abdomen are enlarged. The patient is dyspeptic, sallow, and

much emaciated; hemorrhages are apt to occur from the stomach and bowels.

The disease is *cirrhosis.*

330. In the early stages the size of the liver is often increased, and its uneven surface can be felt below the ribs; there is pain in the right hypochondrium, emacia-

FIG. 63.



The enlargement is irregular in shape. (MR. S. MACKENZIE.)

tion, feverishness, loss of appetite, flatulence, pain after food and irregularity of the bowels; the urine is loaded with lithates. The disease occurs almost entirely amongst spirit-drinkers. The ascites arising from cirrhosis may be mistaken for that depending on tubercular or cancerous peritonitis. In cirrhosis you have a

history of an habitual indulgence in ardent spirits, the urine is loaded with lithates, and the dulness in the region of the spleen is increased, none of which are generally present in the latter diseases. In cancerous peritonitis there are also tenderness on pressure, rapid loss of strength and flesh, an early development of the ascites, and tumors can be very often felt in the abdomen.

331. There is a form of atrophy of the liver which sometimes follows the chronic congestion produced by diseased heart; and another variety results from chronic peritonitis. The symptoms in both are similar to those of cirrhosis, but they differ from it in their not being the effects of indulgence in ardent spirits.

CHAPTER VII.

DISEASES OF THE STOMACH.

332. THE principal diseases of the stomach are—congestion, acute, subacute, and chronic gastritis, ulceration, dilatation, cancer, and fatty and lardaceous changes.

333. If digestion has been in progress at the time of death, the mucous membrane will be found partially, or wholly, dissolved by the gastric juice. You must be careful not to mistake the changes thus produced for those of disease. When post-mortem solution has taken place, the mucous membrane is smooth, very thin, more translucent than usual, softened, or entirely dissolved, so that the subjacent muscular coat is left bare, the veins are filled with black blood, and their contents can be easily squeezed out. The splenic region is most commonly affected, and a well-defined irregular line often shows the height to which the digestive fluids have reached. Sometimes only the summits of the rugæ are softened, but in other cases the whole of the coats are dissolved, and the contents of the stomach may be found in the peritoneal cavity, or even in the left pleura. The extreme degrees of softening are most common in children, in persons dying of brain diseases, or in those in whom death has taken place whilst digestion was in progress. You must remember that the mucous membrane of the stomach is almost entirely composed of glands of a tubular form. From the loose manner in which these are united together the first appearances of

disease can be readily distinguished, and you have, therefore, a favorable opportunity of studying morbid changes as they affect glandular structures in general.

334. CONGESTION OF THE STOMACH.—The mucous membrane is covered with a tenacious layer of mucus, it is thickened, is of a deep-red, almost purple color; its rugæ are very prominent, and the vessels seem enlarged and full of blood. Small, round, dark-colored spots present themselves, chiefly in the pyloric region. Microscopically, the vessels are much congested, the coats of the veins often thickened, but the contents of the tubes are composed only of gastric cells.

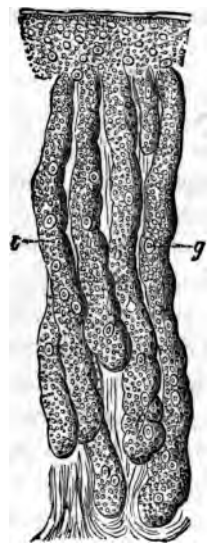
The effect of congestion is to lessen the amount of gastric juice secreted, and thus to impair digestion. It is generally the consequence of some obstruction to the escape of the venous blood from the stomach produced by disease of the heart, liver or lungs.

335. SUBACUTE GASTRITIS, or subacute inflammation of the mucous membrane of the stomach, is much more common than *acute gastritis*, which is rarely met with excepting as the result of irritant poisons. In *subacute gastritis* the stomach is small and contracted, the morbid appearances are those of congestion, often attended by superficial ulcerations. Microscopically, the blood-vessels are injected, the gastric tubes are filled with cells, granular and fatty matters, and in some cases with blood. The disease is often met with in persons affected with anæmia, disease of the kidneys, heart, or uterus, and is almost always found in those who have died of scarlatina, measles, or other eruptive diseases (see Fig. 64).

You will remark that the morbid changes are analogous to those that occur in the kidney in tubular nephritis (see Fig. 41).

336. CHRONIC GASTRITIS occurs under different forms. When present in an extreme degree the whole organ is small, globular in shape, very much thickened, and does not collapse when cut open; but this kind of thickening is usually limited to the pyloric region.

FIG. 64.



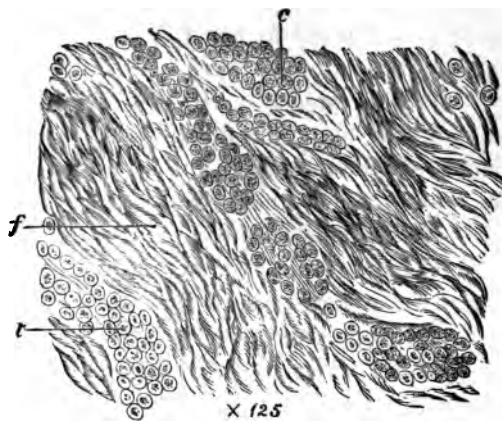
Showing the microscopical appearances of a section of the stomach in subacute gastritis (in a case of scarlatina). *t*. Gastric tubes much distended with cells, fatty and granular matters. *g*. Gastric cells are seen here and there, but most of them are concealed from view by the material that has been effused by the inflammation.

When the mucous membrane is alone affected with chronic inflammation, it is of a slate-gray or dark color, uneven on the surface, as if warty ("*mammillated*"), thickened, and dense. Microscopically, the gastric tubes are at first firmly united together, the bloodvessels are

enlarged and often thickened; at a later stage the tubes are replaced by fibroid tissue, or are only represented by irregular lines of cells (see Fig. 65). The solitary glands are generally enlarged and filled with nuclei and cells, and the gastric tubes seem frequently to be atrophied by the pressure of these bodies.

Chronic gastritis is a common result of long-standing congestion, and is therefore a frequent accompaniment

FIG. 65.



The microscopical appearances of a section of the stomach in chronic gastritis. *t.* Gastric tubes drawn from their normal positions and altered in shape. *f.* Fibrous tissue between and below the tubes. *c.* Cells of the gastric tubes.

of diseases of the liver and heart; it is also generally present in those who have been in the habit of indulging to excess in ardent spirits. In the growth of connective tissue between the gland structures and the atrophy of the secreting tubes by the subsequent contraction of the newly-formed fibres, we have a morbid process analogous to what occurs in the kidney in intertubular nephritis (Fig. 42), and in the liver in cirrhosis (see Fig. 56).

337. Ulceration of the Stomach presents itself under different forms. 1. As *superficial erosions*, resulting from the round, dark spots that so often accompany congestion and subacute gastritis. 2. The *perforating ulcer*. You meet with one or several circular ulcers penetrating the coats of the stomach; their edges are as sharp as if they had been punched out; the circumference of the sore decreases as it proceeds outwards, so that if it has passed through the peritoneum, the perforation of that membrane may be a mere pinhole or chink. This kind of ulcer is chiefly met with in young persons, and may give rise to fatal peritonitis by perforation. 3. The *chronic gastric ulcer*. In this the edges are generally raised, and the surrounding structures are hard and condensed; the surface is formed by the coats not perforated, or by some other organ, such as the liver or pancreas, to which adhesions have extended. It varies greatly in size, and is most common in the smaller curvature near the pylorus. 4. *Sloughing ulcers* are occasionally found in persons much reduced by syphilis, or diseased kidneys, who have during life presented no symptoms of gastric affection. Ulcers of the stomach may heal, and if of large size, their cicatrices may contract and greatly distort the shape of the organ, and thus give rise to dilatation. They may produce death by exhaustion, by hemorrhage caused by the ulceration of a large bloodvessel, or by peritonitis set up by perforation of the peritoneum.

338. Fatty Degeneration of the Stomach is a common affection; the mucous membrane is pale, soft, and easily torn. Microscopically, the gastric tubes are filled with large, fatty, and granular gastric cells; the basement-membrane is thin and very transparent; at a

later stage the whole structure seems to be composed of fat. This condition often accompanies cancer, phthisis, and other wasting disorders.

339. LARDACEOUS DISEASE OF THE STOMACH is usually associated with a similar state of the liver, spleen, and kidneys. It is recognized by the brownish-red tint given to the tissues by a weak solution of iodine. The smaller arteries are generally thickened, and are the parts chiefly affected.

340. In DILATATION OF THE STOMACH the organ is greatly enlarged, sometimes so much so as to fill the whole abdominal cavity; its coats are thin, and when examined with the microscope, the gastric tubes are often found widely separated from each other, and in a state of fatty degeneration. Dilatation is usually produced by a narrowing of the pylorus or duodenum, which prevents the free evacuation of the contents of the organ. This may arise from fibroid or muscular thickening of the part, from the cicatrix of an ulcer, from enlarged glands or other tumors compressing the orifice of the stomach.

341. The stomach is a frequent seat of CANCER, and as its structure affords a very favorable opportunity for investigating the mode of growth of cancerous tumors, it will be advisable here to describe their microscopical characters. Microscopically, all cancers agree in presenting cells of various shapes and sizes, having large and distinct nuclei, often nucleoli. The cells are of the epithelial type, and are grouped together *without any intervening structure between them.* It is this absence of fibres or other material between the individual cells that serves to distinguish cancer from many other forms of tumors. The cancer-cells are contained in hollow spaces

formed by connective tissue, which spaces communicate freely with each other. Bloodvessels are contained in the connective tissue, but do not penetrate amongst the cells. All cancers are malignant—that is, they implicate the neighboring structures, usually recur after extirpation, have a tendency to affect the lymphatic glands, and give rise to structures similar to themselves in other

FIG. 66.



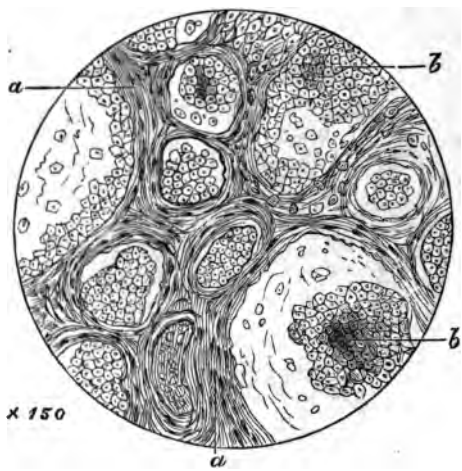
A section of a scirrhus cancer of the breast, as seen under the microscope. A.—*a*. Cells inclosed by the bands of firm connective tissue, *b*. B. The individual cells, showing the variety of shapes they present.

organs of the body. Other tumors of a different structure may present the above characters of malignancy, so that the mere recurrence of a diseased part after a surgical operation does not prove it to have been cancer. Cancers are usually divided into four principal groups:

1. *Scirrhus* forms a dense, hard tumor, which pre-

sents on section a fibrous, glistening surface. Microscopically, the cells are of various shapes and sizes, and are included in hollow spaces formed of thick connective tissue. In the earlier stage the cells are abundant, but afterwards they undergo fatty degeneration, so that eventually the structure seems to consist chiefly of hard, thick bands of fibrous tissue. The favorite seats of this

FIG. 67.



A section of an encephaloid cancer (of a bone) as seen under the microscope. *a*. Connective-tissue fibres inclosing masses of nucleated cells, *b*. Spindle-shaped cells will be observed at *a*, intermixed with the fine fibres.

form of cancer are the breast, stomach, and liver (see Fig. 66).

2. *Encephaloid, Medullary, or Soft Cancer.* — This forms a soft tumor, not unfrequently presenting the appearance of the human brain on section; it grows much more rapidly than scirrhus. Microscopically, nucleated cells of various shapes and sizes generally form the

greater portion of the morbid growth, and the hollow spaces inclosing them are composed of fewer and thinner fibres than in scirrhus. Bloodvessels are often very abundant. This form of cancer is very malignant, and occurs in the testis, ovary, breast, stomach, and many other organs (see Fig. 67).

3. *Colloid Cancer* exhibits numerous cavities filled with a gelatinous material. Microscopically, the cavi-

FIG. 68.



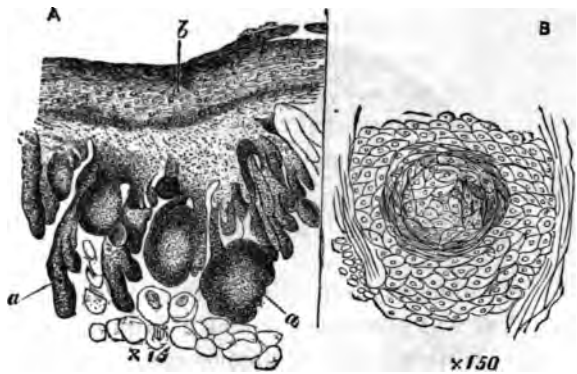
Shows the appearance presented by a section of colloid cancer under the microscope. *a*. A large alveolus. *b*. Smaller alveoli inclosing nucleated cells. (The engraver has expressed the fibres at *a* far too strongly.)

ties inclose nucleated cells, which contain and are also intermixed with the gelatinous matter. Some pathologists look upon this as originating in one of the previously described varieties of cancer in which colloid degeneration has occurred (see Fig. 68).

4. *Epithelial Cancer, or Epithelioma*, always occurs near a mucous or cutaneous surface. It at first forms

a small, hard tumor, which subsequently ulcerates. Microscopically, a section shows a number of nests of cells, in which the outer cells are flattened in a circular form, the inner being round or oval. Fig. 69 shows the disease commencing in the sebaceous glands from which the masses of cells have sprouted in different directions, the appearance of the nests of cells being

FIG. 69.



Shows the appearance presented by a section of an epithelial cancer (of the penis) under the microscope. A. General view of the section under a low power. *a*. Sebaceous glands greatly enlarged, and distorted by the outgrowth of the cancer-cells. *b*. The surface of the cancer. B. A more highly magnified representation of one of the nests of cells as seen on the section of the enlarged sebaceous gland *a*, on the Figure A.

produced by a cross section of these masses projecting laterally.

342. CANCER OF THE STOMACH is most commonly met with at the pyloric or cardiac orifice, or at the lesser curvature. *Scirrhus* is most common at the pylorus. It forms a hard tumor, like cartilage, encircling and constricting the opening into the duodenum. When a section is made, the mucous membrane is generally found

to be ulcerated; the tumor presents a fibrous appearance, traversed by bands; the ulcer has hard, round, projecting edges and an uneven surface. *Medullary cancer* is most frequent at the cardiac orifice, where it forms a soft, fungoid, vascular tumor.

You not unfrequently meet with two of these forms of malignant disease associated together; thus a tumor may be scirrhus with a medullary projection. Cancer of the stomach is very liable to affect the neighboring glands, the liver, pancreas, and peritoneum. Adhesions are usually formed to the surrounding structures, even when the cancer has not extended to them. When the cardiac orifice is obstructed the stomach is reduced in size, on account of the small amount of food that enters it. When the pylorus is constricted, the whole organ enlarges from the food being retained for a length of time.

343. The stomach sympathizes with almost every organ, and you will consequently find it frequently in an abnormal condition. The symptoms that should direct your attention to it are,—pains or uneasiness in the epigastrium or in the left or right hypochondrium, loss of appetite, nausea, vomiting, waterbrash, eructations, or excessive flatulence.

344. The tongue affords most valuable indications of the condition of the gastro-intestinal tract, and also of the system at large. The chief points of which you must take notice are its size and color, whether it is moist or dry, and the amount of epithelium or "coating" covering it. It is large, flabby, or indented with the teeth at its sides, in persons suffering from general debility, and in many chronic affections of digestion; in cases of subacute gastritis it is often small and sharp at its extremity.

Paleness is associated with general anæmia; redness of its surface, tip, edges, or papillæ, usually accompanies subacute or chronic gastritis. When the tongue is covered with a thick fur, there is generally a similar condition of the mucous membrane of the stomach; where, as in scarlatina, it looks raw, the other parts of the gastro-intestinal tract are also affected. Always remember, however, that the abnormal appearances of the tongue may be produced by local causes, such as inflammation of the throat or gums, or by the habit of sleeping with the mouth open. In cancer and ulcer of the stomach the tongue seldom presents any characteristic appearances.

345. You may employ the following means of physical diagnosis to ascertain the state of the stomach: palpation, percussion, auscultatory percussion, and the microscopic examination of the vomited matters, stools, and urine.

346. You make pressure in order to find if there is any tenderness in the region of the stomach; the sense of touch is employed to discover if a tumor is present. Tenderness is best ascertained by pressure with the tip of the finger successively applied to each portion of the epigastrium. Often the patient, especially if a female, will shrink from nervousness when the whole hand is applied to the region of the stomach; in such cases conduct your examination whilst her attention is diverted by conversation. A tumor is most readily felt when the patient lies upon the back, with the head and knees well raised. Always observe the shape and consistence of a tumor, whether it is fixed or movable, if it is tender to the touch, and if it pulsates.

347. In estimating the size of the stomach, first per-

cuss the lower edge of the liver, and the right side of the spleen. The clear sound of the stomach is heard between these organs; it is distinguished from the colon by the clearer character of the sound elicited by percussion. Auscultatory percussion of the middle and pyloric regions is practiced by placing the patient on his left side, and applying the stethoscope to a spot in the epigastrium, where you have previously ascertained by percussion that a clear sound exists; you then mark with a pen the point at which the impulse of the stroke of the finger ceases to be conveyed to the ear with equal force; next let the patient turn to the opposite side, and in a similar manner mark out the larger end of the stomach. In all doubtful cases examine both when the organ is full and empty; and you will often find it an advantage to have the bowels previously emptied by a purgative or an enema.

348. You examine vomited matters with the microscope for the purpose of detecting fungi, or any casts or portions of mucous membrane that may have been thrown off from the surface of the stomach. In the former case, remove a small quantity of the vomited matters with a dipping-tube, place it on a slide, and add a drop of a weak solution of iodine. The iodine makes any starch that may be present of a blue color, whilst it turns fungi brown. The principal forms of fungi you will meet with are torulæ and sarcinæ.

349. Torulæ appear like round or oval vesicles, many of which present little buds projecting from them, or in a later stage of development, they unite so as to form chains. They appear very rapidly whenever fermentation has taken place in the contents of the stomach (see Fig. 70).

350. Sarcinæ are oblong or square bodies, divided

into a number of cells of equal size by lines crossing each other at right angles; they are most frequently found in cases of obstruction of the pylorus or duodenum, but they may be present whenever the food is frequently re-

FIG. 70.

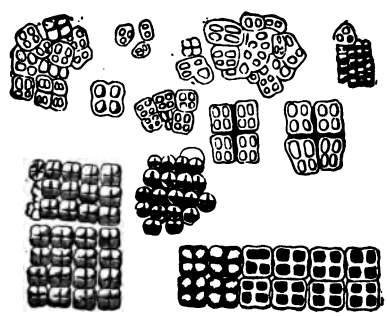


Torula cerevisiæ, or Yeast-plant, as developed during the process of fermentation: *a*, *b*, *c*, *d*, successive stages of cell multiplication. (CARPENTER.)

tained in the stomach for an unusually long period (see Fig. 71).

351. You can only distinguish casts or pieces of mucous membrane when the fluids vomited are clear and

FIG. 71.



Sarcina ventriculi. (CARPENTER.)

free from food. Place the liquid in a conical-shaped glass, remove any particles that may subside with a dipping-tube, and examine them in a thin glass cell. "Casts"

are of the shape of the pits on the surface of the stomach, or of the gastric tubes; two or three are often joined together. You may mistake for them the sarcolemma of digested muscular fibres, but the latter are distinguished by their being transparent, and often containing a few globules of fat. Particles of mucous membrane detached by ulceration are usually stained with blood, and exhibit the characteristic openings of the gastric tubes. You may mistake particles of bread, which also present little cavities, for them, but the holes are irregular in size and shape, and on crushing them, it will be seen that they are not of animal origin.

352. The examination of the urine in cases of disorders of the digestion is very important; for instance, in diabetes the patient frequently complains more of disordered digestion than of an increase in the amount of the urine. Ascertain if there is any albumen, take the specific gravity, and note if there is any deposit, and if so, what is its nature (262).

353. The appearance of the stools often supplies important evidence of abnormal states of the digestion. Sometimes the imperfect solution of the albuminous materials of the food is shown by lumps of undissolved muscular fibres; at other times (chiefly in children) the evacuations consist of masses of unaltered starch, the nature of which is easily recognized by the addition of a weak solution of iodine. A pitchy appearance of the motions, proving the presence of blood, often assists in the diagnosis of gastric ulceration and cancer.

354. Commence your inquiries by ascertaining whether the complaint has commenced suddenly or gradually; if suddenly, begin at (355); if gradually, pass on to (361).

Section I.

ACUTE DISEASES OF THE STOMACH.

355. Under this head you have only bilious vomiting and subacute gastritis. Both of these affections are usually accompanied by vomiting; but as this symptom is also often present in diseases of the brain, you will frequently find it difficult to determine which organ is in fault. Remember that in gastric vomiting there is generally some tenderness of the epigastrium, nausea, or a sense of weight at the stomach; none of which occur in head attacks. In disorders of the digestion the tongue is foul, and the bowels sometimes purged; in those of the brain the tongue is generally clean, and the bowels obstinately confined; in the former, the headache is less persistent and intense, and giddiness, if present, is relieved by the vomiting; in the latter, various other symptoms, such as indistinctness of vision, loss of memory, convulsions, &c., are apt to supervene. When you suspect a disease of the brain, never neglect to examine the optic disks with the ophthalmoscope.

356. *a.* The patient is subject to attacks of vomiting of bile, mucus, or acid, which are accompanied by headache, a foul tongue, loss of appetite, thirst, confined bowels; the urine is scanty, and loaded with lithates, the pulse is seldom quickened, and the heat of the skin is not increased.

The disease is a *bilious attack.*

357. The illness is often preceded by drowsiness and the frequent passing of pale urine. In the intervals

between the attacks there are generally symptoms of chronic gastritis or atonic dyspepsia. The attacks may be only occasional, and may result from some error in diet, or they may occur frequently without apparent cause; in females they are not uncommon at the catamenial periods. If the vomiting should last longer than twenty-four hours, examine the fluids rejected from the stomach for torulæ, the presence of which in some cases keeps up the irritation of the mucous membrane.

358. *b.* The patient suffers from *constant* vomiting, pain, or uneasiness, and also tenderness at the epigastrium; the tongue is red or coated; complete loss of appetite, with thirst, is also present. The pulse is quick, and feeble, and there is great depression of strength.

The disease is *subacute gastritis.*

359. The fluid vomited is composed chiefly of mucus, often streaked with blood; in some cases casts of the gastric tubes or even particles of the mucous membrane can be recognized with the microscope. The severe forms occur most frequently in persons who have long suffered from diseases of the heart, kidneys, liver, or uterus, and often end fatally. A less dangerous variety occurs in rheumatism, gout, and in young females in whom the catamenial functions are disordered. Subacute gastritis may persist for many months, especially in young persons, and vomiting of food may be the most prominent symptom.

360. Always examine the state of the heart when the above symptoms are present, for pericarditis may exist without any other signs than pain and tenderness of the epigastrium and vomiting. You distinguish subacute

gastritis from bilious attacks by the persistence of the symptoms, the absence of severe headache, and the presence of thirst and quickness of pulse in the former complaint; in bilious attacks the patient has probably suffered previously in a similar manner, or is able to trace his illness to some indiscretion in diet. Long-continued vomiting, without sufficient cause to account for it, may suggest to your mind the possibility that it arises from the exhibition of some poison; in such a case, ascertain if the vomiting occurs shortly after the taking of food or medicine, and carefully examine what is rejected from the stomach.

Section II.

CHRONIC DISORDERS OF THE STOMACH.

361. Ascertain if there is pain in the region of the stomach, commencing or aggravated shortly after food, and if there is tenderness of the epigastrium. If neither of these symptoms are present, begin at (362); if they are present, pass on to (366). If the stomach is found by percussion to be much enlarged, pass on to (377).

A. Pain is either absent, or if present, it does not commence, nor is it aggravated, shortly after food, and there is no epigastric tenderness.

362. Under this head you have atonic dyspepsia and gastric neuralgia.

363. *a.* The patient complains of weight, tightness, or a feeling of discomfort during digestion. The tongue is large, flabby, or indented at the sides, often thinly

furred; bad appetite, flatulence, coldness of the extremities, depression of spirits, feeble pulse, and confined bowels are also present.

The complaint is *atonic dyspepsia.*

364. The pain is seldom severe; it may be caused by flatulence, and relief is obtained when air escapes from the stomach; or it may take place when the stomach is nearly empty, and is then relieved by food and stimulants; or it precedes the rejection of a thin, tasteless fluid (*pyrosis*). There is frequently great nervousness, irresolution, or mental depression. The urine often deposits oxalates or triple phosphates. The complaint is common in the old and in feeble persons, and is often caused by insufficient food, anæmia, leucorrhœa, the excessive use of tea, and other causes tending to produce debility.

365. *Gastric neuralgia*, unaccompanied by organic affection of the stomach, is a comparatively rare disease. The pain is very severe, usually periodical, and the disorder seems in most cases to have resulted from ague. The diagnosis is mainly determined by the severe character of the pain, the absence of tenderness, and our inability to discover any definite cause to which it can be attributed.

B. Pain is increased shortly after food, and there is tenderness on pressure in the epigastrium.

366. You may have under this head, chronic gastritis, ulceration, and cancer.

367. *a.* You find a dull pain or oppression shortly after food, sometimes vomiting of acid or mucus. The tongue is coated, and indented with the teeth, or red at the tip or edges. The patient is liable to acid eructations or heartburn, flatulence, thirst, burning of the

hands or feet. The bowels are usually confined, and the urine high colored, depositing lithates, lithic acid, or oxalate of lime.

The disease is *chronic gastritis.*

368. The symptoms vary greatly in degree. In some cases the pain is severe, in others scarcely felt; sometimes there is considerable tenderness, occasionally but little. In all probability, where the pain and tenderness are slight but the tongue is foul, and the thirst, acidity, and flatulence are well marked, the complaint is rather congestion than inflammation of the mucous membrane. You must remember that when the patient recovers from gastritis the stomach still remains for a time incapable of efficiently performing its functions, and thus many cases are followed by atonic dyspepsia. Chronic gastritis usually accompanies affections of the heart, liver, and kidneys, and is almost always present in drunkards. It often occurs in consumption, and may distract your attention from the real source of danger. Whenever, therefore, you find an obstinate case, attended with much loss of flesh, you must carefully examine into the condition of the lungs.

369. The chief difficulty in diagnosis is to distinguish between chronic gastritis and atonic dyspepsia. In chronic gastritis the uneasiness after food is more severe than in atonic dyspepsia, the epigastrium is tender, the pulse often quickened, slight feverishness is felt, especially towards night, the tongue is foul, and the urine often deposits lithic acid. In atonic dyspepsia there is no tenderness, the pulse is soft and feeble, the feet are cold, the tongue flabby, not much furred, and the urine often deposits oxalate of lime or phosphates.

370. *b.* There are fixed and severe, sharp or cutting

pains localized in the epigastrium, back, or hypochondrium, commencing or aggravated very shortly after food, also tenderness on pressure of the epigastrium, and vomiting of food with relief to the pain. Blood is sometimes rejected from the stomach, or the stools are of a pitchy character. The patient is emaciated, the pulse feeble, the skin cool, the bowels usually confined.

The disease is probably *ulceration of the stomach.*

371. In the early stage the pain is only a feeling of tightness after food, but it increases gradually until it becomes a severe wearing or burning sensation. It is sometimes relieved by position; thus lying on the back gives relief if the ulcer is on the anterior part of the stomach, or leaning over a chair alleviates the suffering produced by one on the posterior surface. Vomiting of blood (*hæmatemesis*) occurs in diseases of the heart and liver; but if it takes place where these are absent, and is accompanied by the other symptoms of ulceration, it renders the diagnosis almost certain. Ulceration often occurs in young persons, and the symptoms are sometimes very obscure; in old or middle age, its duration is generally long, and the indications are well marked, but the symptoms may for a time disappear. It may destroy life by exhaustion, hemorrhage, or perforation and consequent peritonitis. If the ulcer heals, it may produce contraction of the pylorus and dilatation of the stomach.

372. You distinguish ulceration from neuralgia by the pain in the former being increased, in the latter diminished by food and by pressure on the epigastrium; neuralgia often alternates with, or accompanies pains in the nerves of other parts of the body, and is not attended by loss of flesh and strength.

373. *Hæmatemesis* is generally preceded by nausea,

sinking and uneasiness at the pit of the stomach, and is accompanied by a feeble pulse, paleness of the face, sighing, and other signs of fainting. It is sometimes difficult to determine whether the blood has come from the lungs or stomach; in the former case it is bright and frothy, in the latter dark, clotted, often acid; in hæmoptysis the attack is preceded by cough and expectoration, and is followed for some days by the expectoration of blood and mucus; hæmatemesis is preceded by pain of the stomach or indigestion, and is followed by dark, pitchy stools, that prove that the blood has passed from the stomach through the intestines.

374. When perforation of the stomach or intestines takes place, the patient is suddenly seized with agonizing pain in the bowels, attended with great prostration of strength, faintness, nausea, or vomiting. These symptoms are quickly followed by the extension of pain over the whole abdomen, great distension and intense tenderness of the abdomen, along with shrunken features, coldness of the skin, and a rapid, feeble pulse.

375. *c.* There are severe lancinating pain, and tenderness in the epigastric or hypochondriac region, often confined to a circumscribed spot. A hardness or tumor can be detected; there is vomiting of fluid, often having the appearance of "coffee grounds," which does not relieve the pain. The patient is feeble and sallow, and the emaciation is both marked and progressive.

The disease is *cancer of the stomach.*

376. The patient seldom lives more than twelve or eighteen months after the commencement of the disease. It occurs chiefly in elderly persons; the liver is often secondarily affected, and jaundice takes place. Not unfrequently the complaint is ushered in by waterbrash.

The orifices of the stomach are more generally affected than the other portions. If the cardiac opening is attacked, the food seems to stick behind the sternum, and is almost immediately returned; if the pylorus is the seat of the disease, you have pain occurring some time after food, and the stomach is liable to become dilated. The chief difficulty in diagnosis is between cancer and simple ulcer of the stomach. To distinguish between them, remember that cancer is often hereditary, and seldom occurs below forty years of age, it rapidly runs its course, the pain is more severe, neuralgic, less influenced by food, and less relieved by vomiting than in simple ulcer, and the blood when vomited is smaller in quantity, and of darker color. Above all, no tumor can be discovered in simple ulcer of the stomach, whilst the sallowness of the skin and emaciation are strongly marked in cancer. In the later stages of cancer the breath is sometimes fetid. You may, however, have cancer of the stomach, *unattended by either pain or vomiting*, but the patient rapidly wastes in strength and flesh, is of a sallow, unhealthy color, loses all appetite and is subject to the symptoms of atonic dyspepsia.

C. The stomach is much increased in size.

377. *a.* The stomach is found by percussion to be much increased in size, the patient complains of a burning pain and of vomiting large quantities of sour, frothy, dark-colored fluid, along with mucus, in which the microscope detects torulæ and sarcinæ; he is thin, pale, feeble, and emaciated.

The disease is *stricture of the pylorus.*

378. The stricture may arise from fibroid or muscular thickening, cancer or a cicatrized ulcer of the pylorus or duodenum; consequently, the history of the case varies,

but by the previous symptoms you will generally be able to determine the cause of the obstruction. The vomiting does not occur, as in ulcer and cancer of the stomach, shortly after food, but may take place only once or twice a day, or be absent for many days, when *a large quantity* of frothy, fermenting, sour liquid is rejected, containing sarcinæ and torulæ (Figs. 70, 71). It is always a very chronic disease, and in some cases can be traced to blows or other injuries to the epigastrium. The abdomen is generally much distended, the superficial veins are enlarged, and in some cases the movements of the dilated stomach can be observed through the abdominal walls. The thickened pylorus can be occasionally distinguished as a hard tumor, but this is not necessarily situated in the epigastrium, for it may be displaced by the weight of the enlarged stomach, and may present itself even in the hypogastric or inguinal region.

CHAPTER VIII.

DISEASES OF THE PERITONEUM AND INTESTINES.

379. THE most frequent diseases of these parts are—peritonitis, enteritis, typhlitis, inflammation and ulceration of the small intestines, intussusception and strangulation of the intestines, stricture, dysentery, malignant and tubercular disease.

380. In ACUTE PERITONITIS, or inflammation of the peritoneum, the serous membrane is opaque, reddened, and softened; the intestines are more or less adherent and covered with lymph; the abdominal cavity contains a turbid fluid or pus. In CHRONIC PERITONITIS the whole of the abdominal viscera may be matted together by adhesions, and pus may be collected between the coils of the intestines, or the inflammation may have been local, and some organ may be attached to the abdominal walls or to the adjoining parts. Microscopically, the same appearances are presented as in inflammation of the other serous membranes (see pleurisy).

The first effect of peritonitis is to set up fever; the muscular coat becomes paralyzed, the intestines are consequently distended with gas, the diaphragm is pushed upwards and the breathing impeded. In case of recovery, the adhesions may form loops in which a coil of intestine may afterwards be entangled and become strangulated. *Acute peritonitis* is generally produced by the extension of inflammation from some organ covered by the serous membrane, by the escape of the contents

of the stomach or intestines into the peritoneal cavity caused by ulceration, by wounds, or other injuries to the abdomen, or it occurs as a complication of Bright's disease, pyæmia, or tubercular consumption. *Chronic peritonitis* may result from tubercle or cancer. The tubercle is deposited in the shape of small granulations beneath the serous membrane, the folds of intestine are closely united together, and not unfrequently ulceration of the mucous membrane takes place, and fecal abscess is produced.

381. The mucous membrane of the small intestines presents inflammatory changes similar to those observed in the stomach. *Congestion* is a frequent result of diseases of the heart and liver. In *inflammation* (*intestinal catarrh*) the mucous membrane is soft, of a red color, and covered with a layer of closely adherent mucus; in chronic cases it is often gray, thickened, and more tough and hard than in the normal state. When the inflammation is acute, the microscope shows the bloodvessels to be congested, the tubes of Lieberkühn choked with cells and granular matters, the solitary glands enlarged, the villi granular, sometimes atrophied, or altogether destroyed. Enlargement of the solitary glands occurs in inflammation of all mucous membranes. The bloodvessels surrounding the follicle become dilated, the cells in its interior greatly increase in number, and thus cause the augmentation in the bulk of the follicle. *Ulceration* most frequently accompanies phthisis and typhoid fever; Peyer's patches and the solitary glands being the parts chiefly attacked. Perforation of the intestine not unfrequently occurs in fever, but is rare in phthisis.

Intestinal catarrh results from venous congestion produced by diseases of the heart, lungs, or liver, from cold

and damp weather, or from irritation excited by improper food, an abnormal state of the bile, or the other secretions that are poured into the digestive canal. A diseased condition of the mesenteric glands often accompanies inflammation and ulceration of the intestines.

382. The term ENTERITIS is generally restricted to cases in which all the coats of a portion of the intestinal canal are inflamed. The part affected is found to be dilated after death from paralysis of the muscular coat, the peritoneum covering it is inflamed, sometimes adherent to the neighboring portions of gut, and the mucous membrane is much congested and covered with a layer of mucus.

383. In INTUSSUSCEPTION one portion of the intestine becomes included within the part immediately below it; usually the ileum becomes included in the cæcum, and this is again inclosed in the colon. Slight degrees of this affection are often found in persons who have died of diseases of the brain, the condition probably taking place shortly before death. Fatal cases generally occur in children. The peritoneal surface of the tumor thus produced is inflamed, and when it is laid open, the included intestine is found of a dark color, and not unfrequently gangrenous. In some rare cases sloughing takes place, and the strangulated part of the intestine is discharged by stool.

Obstruction of the intestine may be also produced by the gut becoming entangled in adhesions resulting from previous peritonitis, by narrowing of the canal (stricture), by the pressure of tumors, or by twisting of the bowel. The lower portion of the ileum is usually the part entangled in internal strangulation; stricture is ordinarily in the large intestine.

384. INFLAMMATION OF THE CÆCUM is named *cæcitis*, or *typhlitis*, that of the colon *colitis*. The mucous membrane of the large intestine presents morbid appearances similar to those observed in other parts of the intestinal canal; chronic ulcerations are often met with in persons who have died of other visceral diseases.

385. DYSENTERY appears generally to commence by inflammation of the solitary glands of the colon; these ulcerate and are destroyed, the mucous membrane of the intervening parts being red, thickened, soft, or pulpy, and covered with a purulent mucus. It is believed by some pathologists, that dysentery commences as a mere catarrhal inflammation, and that the sloughing is set up by the contact of the fæces with the irritated mucous membrane. In persons who have died of chronic dysentery contracted in tropical climates, you will often find the coats of the intestine much thickened and indurated, and large portions of the mucous membrane destroyed by ulceration. When dysentery has been cured, the patients are occasionally liable to obstinate constipation arising from the contractions caused by the healing of the ulcerations. Sometimes the colon is affected with *diphtheritic* inflammation, the mucous membrane being covered with a firm coating of lymph, which forms a cast of its inner surface.

386. PERITYPHLITIS is the name applied to inflammation of the connective tissue in the vicinity of the cæcum. It usually arises from perforation of the appendix, produced either by ulceration or by concretions contained in this part of the intestinal canal. The concretions are chiefly composed of phosphate and carbonate of lime. Peritonitis is also often set up by perforation of the appendix.

387. STRICTURE may occur in the small or large intestine, but it is much more frequent in the latter. It generally results from cancer commencing in the submucous coat, and is most commonly found in the rectum, or in the sigmoid flexure of the colon. In other cases it is produced by the cicatrization of extensive ulcerations.

388. TUBERCULAR AFFECTIONS of the intestinal canal are exceedingly common, ulcerations of this character existing in the majority of those who die of phthisis. The tubercle is first deposited in the solitary and Peyerian glands, softening takes place, and ulcerations are produced. They are most common in the lower part of the small intestine, but the commencement of the colon is also often implicated in the disease. Microscopically, there are generally miliary nodules upon the external coats of the smaller arteries. Just as when tubercle occurs in other situations, the new growth is believed to originate in the lymphatic structure situated close to the walls of the arteries (see Fig. 75).

389. The symptoms that should lead you to suspect disease of the peritoneum or intestines are,—pain or tenderness of any part of the intestinal canal, swelling of the abdomen, vomiting, constipation, diarrhœa, the passing of blood or mucus by stool.

390. In every case it is necessary to inquire into the manner in which the bowels perform their functions. When constipation or diarrhœa is complained of, you should always ascertain what your patient means by the term he uses. In some persons, when in a state of health, the bowels act only once in every two or three days, in others two or three times a day. Constipation, when long continued, may produce hard swellings in the colon, which may be mistaken for morbid growths. These are

most common in the cæcum and sigmoid flexure; they are generally movable, and not tender, and are doughy when pressed by the finger (Fig. 72). In cases of diarrhœa always examine the fecal evacuations, for many patients describe as purging the frequent passing of scanty stools, resulting from constipation.

391. Ascertain first whether the disease has been recent, or is of long standing. If recent, begin at (392); if chronic, pass on to (416).

Section I.

ACUTE DISORDERS OF THE PERITONEUM AND INTESTINES.

392. Inquire if the patient suffers from severe pain, and, if so, commence at (394); if pain is absent, or if, when present, it is only a slight griping, pass on to (409).

393. If the pain is severe, observe whether it is continuous or occasional, or if it is aggravated at intervals, and inquire if the patient has had previous attacks of a similar character. In every case of severe pain try whether the abdomen is tender in any part. In some instances slight pressure is sufficient to provoke pain, in others it is necessary to apply the hand firmly before it is complained of.

394. *A. The attack has been sudden, and is attended with considerable pain.* Under this head you may have peritonitis, enteritis, colic, intestinal obstruction, dysentery, the passage of a biliary (307), or renal calculus (249).

395. *a.* There is continuous, severe, diffused pain of the abdomen, the tenderness is intense; the abdomen is distended; the breathing is rapid (40 to 60 in a minute) and thoracic; the patient rests on the back, with the knees raised. There are frequent vomitings, foul tongue, confined bowels, quick and wiry pulse, thirst, hot dry skin, and no appetite.

The disease is *acute peritonitis.*

396. The complaint often commences with rigors and fixed pain in some part of the abdomen, sometimes with pain and difficulty in passing urine; the pain in either case soon diffuses itself over the whole abdomen. In some instances a friction sound can be detected with the stethoscope placed over the inflamed part. Towards death the face becomes pinched, the pulse rapid and flickering, cold sweats appear on the skin, and constant hiccup occurs. The most common causes of peritonitis are injuries to the abdomen, cold, puerperal fever, perforation of the stomach or intestines, and disease of the kidneys. In perforation, the patient is suddenly seized with intense pain of the abdomen, attended with great faintness, the pulse is rapid and feeble, and there is often nausea or vomiting, the countenance is anxious and sunken, and the skin cold and clammy. Usually you have a history of hæmatemesis, pain after food, diarrhœa or other symptoms of ulceration of the stomach or intestines; but the perforation may occur in persons who have appeared to be previously in perfect health.

397. Acute peritonitis may be confounded with inflammation of the bladder, rheumatism of the abdominal muscles, hysteria, enteritis, and colic. In cystitis the pain is confined to the region of the bladder, and the introduction of a catheter may remove it. In rheuma-

tism the pain is scarcely felt except on motion, the tenderness is as great on slight as on deep pressure; there is neither the fever, rapid pulse, nor the general distress of peritonitis. In hysteria the *surface* of the skin is tender, the pain is comparatively slight, the pulse is not much quickened, and vomiting is absent.

398. Partial peritonitis often occurs over the liver, stomach, uterus, and other abdominal organs, but the pain and tenderness are confined to the part affected, and the fever is comparatively slight.

399. *b.* The patient complains of pain of the abdomen, which is confined to one part and is increased by pressure. There are nausea or vomiting, confined bowels, quick wiry pulse, thirst, hot dry skin, and want of appetite. The patient lies on his back, with the knees raised.

The disease is *enteritis.*

400. This complaint often commences like colic, with severe but intermitting pain; it may arise from internal strangulation of the intestine, hernia, fecal accumulations, or from undigested food, such as raw apples, &c. You may mistake acute peritonitis, colic, or intestinal obstruction for enteritis. It is distinguished from acute peritonitis by the more local character of the pain and tenderness, by the pain being generally confined to the neighborhood of the navel, and by the symptoms being less acute and violent; from colic, by the tenderness on pressure, the quick pulse, fever, and general prostration; from intestinal obstruction, by the early occurrence of the pain and tenderness, and the rapid progress of the case. As the bowels are usually confined in enteritis, always examine if hernia is present, for strangulation of the intestine may give rise to similar symptoms. In

some cases of enteritis an increased pulsation of the abdominal aorta has been observed.

401. *c.* There is severe pain, occurring in paroxysms, near the umbilicus, usually coming on suddenly, but unaccompanied by tenderness on pressure; often vomiting of bile or mucus; bowels generally confined; pulse little affected, and no great heat of the skin nor abdominal pulsation. The patient often groans or screams, rolls about, or presses on the abdomen to relieve the pain.

The disease is *colic.*

402. Many persons are subject to attacks of colic, especially those whose bowels are habitually confined; it is also one of the most common accompaniments of lead poisoning (*lead colic*), and is therefore often observed in painters, workers in lead factories, and others whose occupations bring them into frequent contact with this metal; in these cases you will find a blue line on the gums surrounding the teeth.

403. Colic may be confounded with peritonitis, intestinal obstruction, the passage of biliary or urinary calculi, neuralgia of the dorsal nerves, or hernia. From peritonitis it is distinguished by the absence of pain on pressure, and of fever, by the local character of the pain, and the smaller amount of depression; from gallstones, by the sudden commencement and termination of that complaint, by the pain produced by the passage of a calculus being in the site of the gall-duct, by the vomiting being generally more severe, and the fluid rejected more acid than in colic, and by the attack being often followed by jaundice. The passage of a urinary calculus differs from colic in the pain affecting the back, thigh, and testis, in the frequency of urination, in the small quantity of high-colored, often bloody, urine that

is voided during the attack, and the history of small stones or gravel having been previously passed. Neuralgia sometimes simulates colic, but in it there are generally superficial tender spots in the course of the nerves, and the pain is confined to one-half of the body. You seldom find severe pain in hernia, but you should in every case of colic carefully examine all the usual places of hernial protrusions.

404. *d.* The patient complains of a constipation of the bowels that has resisted the action of purgatives; the abdomen is much distended, there are urgent vomiting, quick pulse, thirst, and loss of appetite. Usually at some period of the case fixed pain of the abdomen comes on.

The disease is *intestinal obstruction.*

405. The obstruction may arise from a portion of the intestines becoming strangulated by old adhesions or malposition of other parts of the canal, from intussusception, from stricture produced by cicatrices, inflammation of the coats of the gut, cancer, &c., from the impaction of a gallstone or fæces. When the complaint is produced by internal strangulation the symptoms usually follow directly upon some sudden or severe muscular exertion, and the patient can from the first point out the exact part where the pain is situated. When the gut is twisted the symptoms are more gradually developed, and pain may be absent for many days after insuperable constipation has commenced. When intussusception occurs, the first symptom is usually a colicky pain, followed by the discharge of bloody mucus and ineffectual efforts to relieve the bowels; in some cases a hard, tender tumor can be discovered where the pain is felt; it is, however, exceedingly rare in adults.

If stricture has produced the obstruction, you have a history either of frequent vomiting and loss of flesh, or of obstinate constipation, according as the upper or lower part of the intestinal canal is affected. When the impaction of a gallstone has given rise to the symptoms, they have generally been preceded by severe pain in the right hypochondriac region and vomiting, followed by jaundice.

406. If the obstruction is seated in the upper part of the canal, the vomiting begins early and is bilious, the abdomen is not much distended, and the amount of urine secreted is scanty; when it occurs in the large intestine the vomiting is late in beginning, the matters rejected are at first bilious, afterwards feculent,[1] the abdomen is greatly distended, the shape and movements of the bowels can be sometimes distinguished through the abdominal parietes, and the amount of urine is copious. In every case of obstruction of the bowels the patient must be most carefully examined for hernia, and the condition of the rectum and the colon should be ascertained by the finger and a long flexible tube.

407. *e.* There is griping pain of the abdomen with some tenderness in the region of the colon; frequent desire to go to stool, attended with straining and the passage of blood, mucus, or jelly, mixed with lumps of fecal matter (*scybala*). The patient is restless, has a furred tongue and thirst, the skin is cool, the pulse is small, but not much quickened.

The disease is *dysentery.*

408. This disease is most common in hot climates, but it occurs also occasionally in this country. Death may

[1] Cases of obstruction attended with fecal vomiting used to be described as *Ileus.*

take place at an early period, or the complaint may become chronic. The symptoms usually commence with rigors, chilliness, or diarrhœa; towards a fatal termination the abdomen becomes tender, the pulse rapid and feeble, the tongue dry, red, and glazed, the stools are passed involuntarily, and are of a greenish color, or like washings of raw meat. In some cases severe hemorrhage occurs from a large artery being opened by the ulceration, in others (chiefly in tropical dysentery) abscess of the liver is subsequently produced. You may for dysentery mistake piles, morbid growths, or cancer of the colon or rectum, but a careful examination of the gut with the finger or bougie will prevent such an error. It is distinguished from diarrhœa by the constant straining, the severe pain, and the character of the stools. In this country we generally meet with dysentery as a chronic disease,—often the result of the acute form contracted in tropical climates. The patient is emaciated, pale, and exhausted, and the disease is usually associated with chronic diarrhœa.

B. The attack has been sudden, but it is not attended with much pain.

409. You have under this head, Asiatic cholera, simple cholera, and acute diarrhœa.

410. *a.* The patient is affected with constant vomiting and diarrhœa, at first of bilious, afterwards of watery ("rice-water") stools. The face is blue and cadaverous, voice whispering, skin and breath cold, urinary secretion suppressed, pulse exceedingly feeble or imperceptible, but the intellect remains clear. He suffers from violent cramps in the extremities.

The disease is *Asiatic cholera.*

411. This complaint only occurs in temperate climates

as an epidemic, and when once seen can never be forgotten. The patient is usually attacked during the night, or early morning, with a feeling of oppression, nausea, or vomiting, followed by severe diarrhœa. The stage of collapse is usually preceded for a few days by diarrhœa, in other cases the invasion is sudden. Occasionally there is rapid sinking without diarrhœa. If the stage of collapse be overcome, the patient generally falls into a typhoid state, which often proves fatal. In the stage of collapse the temperature is 90° to 95°.

412. *b*. The patient suffers from constant vomiting and diarrhœa of bilious or of pale, watery stools, usually preceded, or attended, by a griping pain of the abdomen and severe cramps of the extremities. The pulse is feeble, the voice husky, and there are great thirst and depression.

The disease is *simple cholera*.

413. In children the complaint often proves fatal, but recovery usually occurs in adults, although the symptoms are sometimes apparently as severe as in the Asiatic form of the disease.

414. *c*. The patient suffers from diarrhœa, without vomiting, generally attended with some griping pain. There are often thirst and deficient appetite, but no fever and not much depression.

The disease is *diarrhœa*.

415. You generally find that diarrhœa is produced by indigestible food; in other cases the stools consist almost entirely of bile.

Section II.

CHRONIC DISEASES OF THE PERITONEUM AND INTESTINE.

416. First inquire if there is severe pain, and if so, begin at (417); if not, pass on to (422).

A. The patient suffers from severe pain.

417. Under this head you may meet with chronic peritonitis, cancer of the peritoneum, chronic dysentery (408), affections of the cæcum and its appendix.

418. *a.* The patient has pain, tenderness, and distension of the abdomen, which is clear on percussion, sometimes with intervening portions of dulness, and retains its shape when the body is moved from side to side; the bowels are usually purged, the pulse is quick and feeble, the skin hot, appetite bad, and thirst and emaciation are present.

The disease is *chronic peritonitis.*

419. Chronic peritonitis sometimes follows acute peritonitis, or it may be produced by an injury to the abdomen. The most frequent cause is a tubercular affection of the peritoneum. In this case there is but little fluid effused, and the intestines are glued to each other and to the abdominal walls; consequently the abdomen is spherical in shape and clear on percussion, and this, together with the absence of disease in the heart, liver, and kidneys suffice to distinguish the complaint from ascites. Chronic peritonitis is most frequent in children, and the pain and tenderness are often but slight. It is often accompanied by enlargement of the mesenteric glands, but these very rarely form a tumor capable

of being distinguished during life. In adults the greatest difficulty is to diagnose it from peritoneal cancer. In cancer there is usually a large quantity of fluid effused, with great emaciation, vomiting, and severe pain and tenderness of the abdomen. In colloid disease there are the same symptoms as in the other forms of cancer, but you more frequently find a tumor in some part of the abdomen, and the fluctuation is often very indistinct. In all cases of suspected chronic peritonitis in adults, examine the chest for tubercle and the urine for albumen.

420. *b.* The patient complains of a continuous, dull pain in the right iliac region increased on pressure or motion; a tumor can be felt in this situation, which is rather dull on percussion, but its borders are tympanitic. The bowels are usually confined, the pulse is quickened, and there are thirst, deficient appetite, and sometimes vomiting.

The complaint is *inflammation of the cœcum.*

421. The disease occasionally commences suddenly and with acute symptoms, but usually it is preceded by constipation. It may produce fatal peritonitis by ulceration and perforation of the cæcum or its appendix, or may set up inflammation of the cellular tissue round the gut (*perityphlitis*) and abscess, which may be discharged externally or through the intestines. If the pus burrows under the iliac fascia there is much pain in moving the right leg. You may mistake for it cancer of the cæcum, but in this disease the progress is slow, the tumor is very hard, and there is often malignant disease of the liver or other organs.

B. The patient does not suffer from severe pain.

422. You may have constipation or chronic diarrhœa under this head.

423. Amongst the usual causes of constipation are want of exercise, improper food, lead poisoning, atony of the colon, affections of the brain, stricture of some portion of the large intestines. However produced, it is apt to give rise to flatulence and other signs of indigestion, palpitation, dyspnœa, giddiness, headache, heaviness after meals, coldness of the hands and feet, and inability for much mental or bodily exertion.

424. *Chronic diarrhœa* may result from malaria, improper food, the abuse of purgatives, ulceration of any part of the intestinal canal, and other general or local causes. It is a common accompaniment of chronic diseases of the kidney and liver, phthisis, typhoid fever, diseased mesenteric glands, chronic peritonitis, and other disorders. When it persists longer than two or three weeks in an adult, we may suspect that it arises from some more serious ailment than slight intestinal catarrh, which is its usual cause.

CHAPTER IX.

ABDOMINAL TUMORS.

425. BEFORE entering on the diagnosis of tumors of the abdomen, it is necessary that you should make yourself acquainted with the various morbid changes to which the abdominal organs are liable, and the signs by which these changes may be recognized. Observe if the enlargement of which the patient complains is general and uniform (426), or is confined to one part of the abdomen (437).

SECTION I.

THERE IS A GENERAL AND UNIFORM ENLARGEMENT OF THE ABDOMEN.

426. The enlargement may be produced by an abnormal amount of air in the stomach or intestines, by fluid in the peritoneal cavity, or by a solid tumor.

427. Commence by percussing the whole of the abdomen, and if you find the sound everywhere tympanitic, the swelling arises from an accumulation of air. If a dull sound is elicited, either over the whole or a part of the abdomen, you have to deal with fluid or with a solid tumor. You distinguish the presence of fluid in the following manner: Place the left hand over a dull portion, and with the fingers of the right tap rather sharply over another dull part; if fluid is present the impulse of the

blow will be felt by your left hand. It is easy to detect fluctuation if the peritoneal cavity is filled with fluid, but when this exists only in a small quantity you must adopt the following method of examination. Let the patient rest upon one side, whilst you percuss the opposite side of the abdomen, where you will probably find a clear resonance. Make him now reverse his position, and if fluid is present, you will elicit a dull sound where it was before tympanitic. If you are unable to feel fluctuation, and the swelling is firm and resistant, you have to deal with a solid tumor.

428. *a.* The abdomen is generally and uniformly enlarged, and the percussion-sound everywhere tympanitic.

The enlargement is caused by *an excessive amount of air in the intestines* (*tympanitis*).

429. Extreme flatulent distension sometimes results from atony of the colon, chronic peritonitis, or intestinal obstruction. In the first the bowels are confined and the patient is liable to colic, but there is neither fever nor emaciation. Chronic peritonitis usually arises from tubercular disease (419); the abdomen is tender upon pressure, and does not change its shape with an alteration of the position of the patient; there are loss of strength and flesh, diarrhœa, a quick pulse, thirst, and, in most cases, some evidence of disease of the lungs. When the distension is produced by intestinal obstruction you have the other symptoms of this condition to guide your diagnosis (404). Flatulent distension is a common symptom of dyspepsia, and is often very distressing, especially when the patient is stout.

430. *b.* The abdomen is generally and uniformly en-

larged, the sound on percussion is dull, and fluctuation can be detected.

There is *fluid in the abdominal cavity.*

431. When the fluid is contained in the peritoneal cavity the disease is termed "*ascites.*" You may mistake for ascites, ovarian enlargement, a cyst connected with the kidney, or a greatly distended bladder.

432. In ovarian dropsy the swelling is first observed in the lower part of the abdomen, and gradually extends upwards. When the patient lies upon her back, the front part of the abdomen is quite dull on percussion, whilst you have a clear sound at the flanks, because the fluid being contained in the cyst does not gravitate. In ascites the flanks are dull when the patient rests on the back, but a clear sound is elicited in the epigastric or umbilical region on account of the intestines floating on the surface of the fluid. In addition to this, the history of the case affords you indications of some visceral disease likely to produce dropsy of the peritoneum, such as disease of the liver, heart, or kidneys. Renal cysts are generally situated at one side of the abdomen, so that percussion affords a clear sound on the opposite side in all positions of the patient's body. If you suspect that the fluctuation arises from a greatly distended bladder, draw off the urine by means of a long catheter.

433. The usual causes of ascites are diseases of the liver, heart, or kidneys, chronic peritonitis, and cancer of the peritoneum.

434. Dilatation of the heart or diseased mitral valve frequently gives rise to ascites. In these cases œdema of the feet precedes the abdominal dropsy, and the patient has previously suffered from cough, dyspnœa, and

palpitation. Ascites produced by kidney disease is usually associated with œdema of the limbs and face, and effusion into the pleura or pericardium. The state of the urine will enable you to decide as to the nature of the affection (220).

435. Diseases of the liver are the most common causes of ascites, on account of the obstruction to the portal circulation they produce. It is generally the result of cirrhosis, the presence of which must be determined by the enlargement of the superficial abdominal veins, the emaciation of the patient, and the other symptoms of that disease (329). Ascites may be produced by cancer of the liver, and more rarely by amyloid degeneration; it seldom arises from chronic congestion, except when this results from disease of the heart or lungs; it is not an accompaniment of hydatids, fatty liver, or hepatic abscess.

436. c. When a solid tumor is sufficiently large to fill the whole abdomen it is generally of a malignant nature. Of course pregnancy must be borne in mind.

Section II.

THE TUMOR IS CONFINED TO ONE PART OF THE ABDOMEN.

437. Nothing but careful and repeated examinations can prevent you from making mistakes in the diagnosis of tumors of this class. In some persons, especially in women who have had large families, the abdominal muscles are apt to contract on the application of the hand, and thus give the feeling of a tumor when none

exists. When you suspect this to be the case you must examine the patient in different positions; relaxing the muscles as much as possible and meanwhile engaging her in conversation. Sir William Jenner recommends that the abdominal muscles should be relaxed by placing the patient on the back with the shoulders somewhat raised, and the back of the head propped up until the chin falls on the top of the sternum, the knees should be bent on the abdomen and supported by an assistant, whilst the feet rest on their soles. In some cases, though very rarely, it is necessary to use chloroform before you can arrive at a positive conclusion.

438. Fecal accumulations sometimes simulate malignant and other tumors; they feel soft and doughy, and are often situated in the cæcum or sigmoid flexure of the colon. In all doubtful cases the bowels should be emptied, either by purgatives or by enemata, before a positive diagnosis is given. The accompanying diagram shows the usual situation of these tumors (see Fig. 72).

439. The presence of an abdominal tumor is often obscured by ascites. When fluid exists in large quantity in the peritoneum, it may be impossible to determine the existence of a tumor until after tapping has been performed; but where there is only a moderate amount of liquid you can often reach the solid mass by suddenly and forcibly pressing the tips of the fingers on the abdomen so as to displace the intervening layer of fluid.

440. When you have satisfactorily determined the presence of an abdominal tumor, consider what organs occupy the region in which it is placed, and try to trace its connection with some one of them. Thus, if it be situated in the right hypochondrium mark out the liver,

and ascertain if there is any connection between this organ and the morbid growth.

FIG. 72.

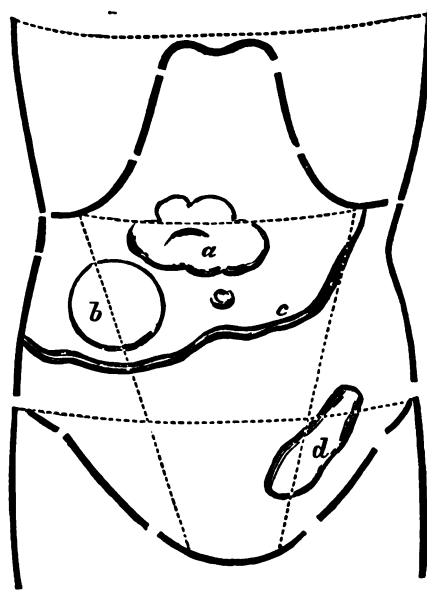


Diagram representing the situations of tumors in four different cases of feculent accumulations in the large intestines. *a*. A nodulated enlargement, existing for many weeks, from fæces in the arch of the colon. *b*. A round tumor, continuing and slowly increasing for many months, from fæces in the ascending colon. *c*. Extensive hardness occupying the whole space included within the double line to the scrobiculus cordis; chiefly depending on large accumulation of fæces in the colon. *d*. Tumor from recent feculent accumulation in the sigmoid flexure of the colon. (BRIGHT.)

441. Observe whether the tumor is fixed or moves during respiration; if it moves, you know that it is either connected with the diaphragm or with some organ which is depressed during inspiration, such as the liver, stomach, or spleen. If it is fixed, it may be an enlargement of some structure, such as the aorta or lymphatic

glands, which are permanently retained in their position, or it may be connected with a movable organ that has become attached by adhesions.

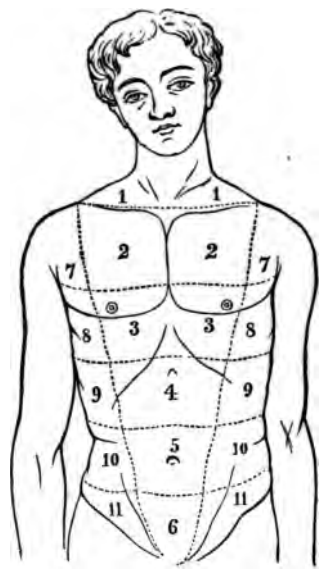
442. Pay especial attention to the state of any of the abdominal organs whose functions are disordered. Thus, if the patient suffered from frequent vomiting of a large quantity of fermenting liquid, and the stomach was found to be enlarged, you would look upon a hard tumor as being connected with the pylorus, although it might be far removed from the normal position of that part.

443. The abdomen is divided into regions in the same manner as the chest; a glance at Fig. 73 and Fig. 74 will make you acquainted with them.

444. RIGHT HYPOCHONDRIUM.—Tumors of the liver, kidney, and gall-bladder are most generally found in this locality. You must remember that the liver may be displaced by emphysema, effusion into the right pleura, fluid in the pericardium (see Fig. 5), or dilated heart, and thus may simulate hepatic enlargement. The diseases of the liver capable of producing a tumor are congestion, cirrhosis in its early state, fatty and lardaceous degenerations, abscess, hydatid cysts and cancer, also dilatation and cancer of the gall-bladder. Hydatids, cancer, and diseases of the gall-bladder are most likely to be confounded with tumors arising from other organs (see Fig. 63). The diseases of the kidney that may produce tumors are dilatation, cystic disease, and cancer. When the tumor arises from the liver it is uncovered by the intestines, its continuity with the remainder of the organ can be generally traced, and there is often jaundice, or ascites. When the kidney is affected there is usually some part clear on percussion, on account of a portion of the colon lying in front of it; or there is, or has been,

pus or blood in the urine, you have a history of stricture, diseased bladder or calculus, or it may be attended with disease of the testis or prostate gland. Medullary dis-

FIG. 73.



4. Epigastric.
5. Umbilical.
6. Hypogastric.
9. Hypochondriac (right and left).
10. Iliac (right and left).
11. Inguinal (right and left).

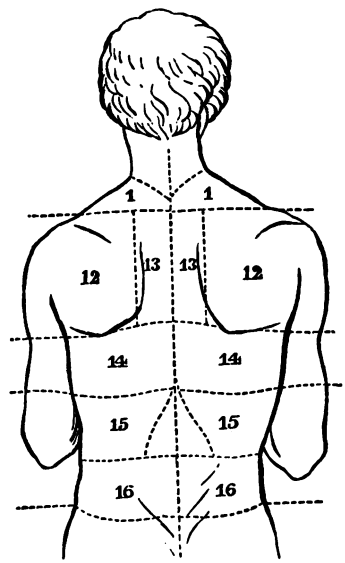
(PAXTON.)

ease of the kidney, in children, is often very difficult of diagnosis, for, on account of the tumor lying behind the intestines, it may seem to consist of two or three separate swellings, and the urine is very often free from blood or pus.

445. EPIGASTRIUM.—Tumors of the liver are also found in this region. Cancer of the stomach may be

recognized by the hardness and irregularity of the swelling and by the pain, vomiting, and other signs of that disease (375). Cancer of the pancreas occasionally forms

FIG. 74.



15. Inferior dorsal (right and left). 16. Lumbar (right and left). (PAXTON.)

a tumor in the epigastrium, but its symptoms vary so greatly, according to the other structures involved, that its diagnosis is generally a matter of great difficulty. In many cases, where no external tumor has been discovered, the urine has been saccharine, and a large amount of fat has been discharged by stool.

446. LEFT HYPOCHONDRIUM.—Although fecal accumulations are sometimes observed in this region, enlargements of the spleen, liver, and kidney are the tumors most frequently met with.

447. You ascertain the size of the spleen by percussion and by the pressure of the hand on the abdomen below the left hypochondrium. In percussing, remember that in a healthy person its anterior and posterior margins correspond to two lines continued perpendicularly downwards from the folds of the left axilla; there is generally a space of about two inches where you find deficient resonance on percussion. If you feel the organ projecting below the left hypochondrium, it is almost sure to be diseased.

448. Congestion of the spleen, is a common accompaniment of intermittent fevers, and of certain diseases of the liver. This organ is very frequently the seat of, lardaceous degeneration where the liver and kidneys are also affected. The spleen when hypertrophied often attains an enormous size; it forms an oval tumor with a smooth surface, and usually presents a deep notch on its anterior border. Microscopically, the whole organ is congested, and the Malpighian bodies are much enlarged from an increase in the number of the cells, and of the fine fibrous tissue of which they are composed. The blood exhibits evidence of disease, it is of low specific gravity, and presents an increase of water and a diminution in its solid constituents. When it is examined with the microscope, the white cells are found to be in such excess that they equal, or even surpass, the red globules in number. This disease of the blood is named *leucocythæmia*, or leukæmia. The patient is pale, anæmic, and feeble, often has dropsy of the abdomen and legs, and is liable to profuse bleedings from the nose and other mucous membranes. Sometimes the thymus and lymphatic glands are enlarged along with the spleen, and the patient dies from exhaustion (Hodgkin's disease).

449. You distinguish an enlarged spleen from a tumor of the left kidney, by finding that it is uncovered by the colon, and therefore quite dull on percussion, that it readily moves during respiration, and that its anterior margin is sharp, often notched, not round, as is the case with the kidney. In addition to these signs, the patient is usually anæmic and subject to hemorrhage, whereas in enlarged kidney there is often blood or pus in the urine. The splenic tumor can be generally moved forwards with the fingers, and there is a space between its posterior border and the spine, in both of which circumstances it differs from enlarged kidney. The left lobe of the liver may be enlarged and in contact with a splenic tumor, but in such a case the right lobe will be found also increased in size, and the spleen can be made to alter its relation to the liver by deep inspiration, or by pressure with the hand.

450. UMBILICAL REGION.—Tumors in this region generally result from the extension of growths connected with the liver or stomach.

451. Enlarged mesenteric glands seldom or never produce an abdominal tumor. Sir W. Jenner states that "enlarged glands may sometimes be detected by grasping the two sides of the abdomen between the hands or between the fingers of one hand; then by bringing the fingers slowly together, you may at last feel the glands between your fingers." When enlarged lymphatic glands are big enough to form a distinct tumor, it is fixed and cannot be moved either by respiration or pressure of the hand.

452. Aneurisms of the aorta and its branches are most generally met with in this and the epigastric region. They are distinguished by the severe neuralgic pains, the

pulsating tumor, and systolic murmur that accompany them. You must, however, be on your guard not to mistake for aneurism an increased pulsation of the aorta that is often met with in dyspeptics, especially in females, or the pulsation of a tumor situated over the vessel. You should endeavor to grasp the tumor on each side, and as an aneurism expands equally in all directions at each impulse of the heart, you will feel the dilatation as much at the sides as in the front, if it be an aneurism. Remember that a murmur may be produced by the pressure of the stethoscope; in case of aneurism you will often be able to hear it behind near the spine as well as in front.

453. LUMBAR REGIONS.—Tumors here are usually connected with fecal accumulations, or with disease of the kidneys, liver, or spleen. Occasionally inflammation takes place in the cellular tissue surrounding the kidney, and abscess is the result; in other instances cancer attacks the spine or lumbar glands, and a tumor is formed in the loins.

454. You examine the size of the kidneys by pressing the fingers into the lumbar regions whilst the patient lies flat upon his face, or rests upon his hands and knees. Sir W. Jenner recommends that "you should place one hand at the back of the patient under the last rib, and outside the mass of the lumbar muscles in the spinal groove; the other you put in front of the patient, just over the hand behind, on the right side, just under the inferior border of the liver. Having put your hands in these positions, so as to have the kidney well between them, depress the hand on the anterior wall of the abdomen as far as possible, diverting the patient's attention, and removing the tension of the muscles. Then, hav-

ing depressed that hand as far as possible, using all possible means to expedite and assist its depression, having brought it down as much as possible, tilt forward the hand that is behind; and in that way the kidney is brought well under the touch of the two sets of fingers—perfectly in the great majority of cases."

455. Remember that tumors of the kidney almost always increase *anteriorly* where there is least pressure; in case, therefore, you find an enlargement in the situation of these organs near the spine, it is in all probability not renal.

456. Iliac Regions.—Diseases of the cæcum, inflammation of the cellular tissue surrounding it (420), or diseases of the ovary, are the most usual causes of tumors in this locality. Ovarian tumors, unless they are of a cancerous nature, are distinguished by their mobility, their connection with the uterus, and the small amount of disturbance of the general health they appear to produce.

457. Hypogastric Region.—Diseases of the bladder and uterus usually produce the tumors in this region. Sometimes, in chronic peritonitis, pus is found inclosed in a sac formed by the coils of intestine adherent to each other.

CHAPTER X.

DISEASES OF THE BRAIN AND SPINAL CORD.

458. THE chief diseases to which the brain and its membranes are liable are—acute and chronic meningitis, hydrocephalus, congestion of the brain, encephalitis, abscess, hemorrhage, softening, and tubercular, cancerous, and other tumors. The spinal cord is liable to meningitis, inflammation of its substance, softening, gray degeneration, and tumors.

459. In CONGESTION OF THE BRAIN the vessels of the membranes are loaded with blood, and an unusual number of bloody points are visible when the substance of the organ is divided. When congestion has been continuous, or often repeated, the bloodvessels become enlarged, and more or less wasting of the substance of the brain takes place. *Active* congestion may arise from an increased action of the heart, as in hypertrophy, from a diminished circulation in the skin or other organs, as in ague, determining an unusual amount of blood to the brain from excessive mental labor, or from wasting of the brain. *Passive* congestion depends on any circumstance that prevents the ready return of the venous blood from the brain, such as the pressure of a tumor, or disease of the heart or lungs.

460. In ANÆMIA OF THE BRAIN the gray substance is usually pale, and, on being cut, very few bloody points are visible. It may result from anything that lessens the quantity of blood in the body, such as severe bleed-

ings, diarrhœa, &c., or from any morbid condition that encroaches on the cavity of the skull, such as a tumor. Portions of the brain may be deprived of their due supply of blood by the vessels being obstructed with clots of blood, by œdema, or by compression of the capillaries by means of tumors, extravasations of blood, &c.

461. MENINGITIS, or inflammation of the membranes of the brain.—The bloodvessels of the pia mater are much enlarged and loaded with blood, the arachnoid is opaque; lymph, or in some cases pus, being situated beneath it. The pia mater is stripped with difficulty from the surface of the brain, which is soft and easily torn away. Microscopically, the smaller bloodvessels are covered with fat and granular matters, and often present dilatations in various parts. They are crowded with white blood-globules, and their external coat and the tissue in their immediate neighborhood are also infiltrated with cells.

The first effect of meningitis is to excite general fever; the exudations resulting from it are apt to produce compression, and thus to give rise to convulsions or paralysis. It is almost always associated with inflammation of the surface of the brain itself, and when not tubercular, is chiefly confined to the convexity of the organ. Inflammation of the dura mater scarcely ever occurs, excepting as a result of injuries or diseases of the bones of the skull.

462. HYDROCEPHALUS, or water in the brain.—This disease consists in the effusion of fluid into the ventricles: it may occur as an acute or a chronic complaint.

463. ACUTE HYDROCEPHALUS, also called TUBERCULAR MENINGITIS.—The surface of the brain is flattened, the ventricles are filled with fluid, and the sub-

stance of the brain is soft and pulpy, especially in the neighborhood of the ventricles; the membranes at the base of the organ, chiefly at the optic commissure and the fissure of Sylvius, are thickened, opaque, and studded with small, miliary tubercles; the membranes on the upper surface are usually but little affected. Microscopically, the tubercles appear to arise from a growth of nucleated cells, around the external coat of the arteries (see Fig. 75). The swellings thus produced com-

FIG. 75.



Tubercular degeneration of a branch of the artery of the Sylvian fissure. The tubercle is seen to have been developed in the outer coat, and compresses the channel of the vessel. (RINDFLEISCH.)

press the arteries, and in some cases the coats of the vessels are perforated by the inward growth of the tumors. The obstruction to the circulation gives rise to congestion and afterwards to inflammation of the membrane.

Tubercles are generally present also in the lungs or other organs.

464. In CHRONIC HYDROCEPHALUS the head becomes greatly enlarged, the bones of the skull widely separated, the fontanelles are open; the ventricles of the brain are distended with fluid, and the substance of the organ is softened and expanded by the pressure of the fluid.

465. ENCEPHALITIS, or inflammation of the substance of the brain, may affect the whole, or only a portion of the organ. General encephalitis is associated with meningitis, and is confined to the surface just below the inflamed membrane. Local encephalitis produces red softening, or abscess.

466. In RED or INFLAMMATORY SOFTENING, the brain is soft, or pulpy, of a red color, often presenting numerous bloody points, and its specific gravity is increased. Microscopically, you see the nerve-tubes broken up and mixed with blood-cells, granular matter, and dark, granular, fatty bodies, like mulberries, named "exudation-corpuscles." The minute arteries are covered with granular and fatty matters. When encephalitis has terminated in abscess, you find, in recent cases, an irregular cavity filled with a yellow, gray, or reddish-colored fluid, bounded by softened brain-structure; in older cases, the pus is *encysted*, that is, inclosed in walls formed of connective tissue. You do not necessarily meet with true pus-cells in the contents of the abscess, but often only granules and exudation-corpuscles in various stages of degeneration. Abscess of the brain generally results from injuries or diseases of the bones, the most common cause being caries of the internal ear.

467. IN THE WHITE, YELLOW, or NON-INFLAM-

MATORY SOFTENING, the substance of the brain is soft, pulpy, and of a white or yellow color. Sometimes capillary hemorrhages are found on the exterior of the affected part. Microscopically, you see the remains of softened nerve-fibres, granular matters resulting from the destruction of the tissue, fatty bloodvessels, and fatty cells produced by the degeneration of the nerve-cells and of the cells of the connective tissue. This condition is always the result of imperfect nutrition of the part affected. It is most frequently the consequence of the blocking up of an artery by a plug, but it also often arises from the pressure exercised by a tumor or hemorrhagic clot upon the circulation of the adjoining parts of the cerebral substance. The *yellow* differs from the *white* softening merely in the difference of color arising from a greater amount of fat, or from the remains of extravasated blood.

468. HEMORRHAGE of the brain is the most frequent cause of apoplexy and paralysis; it may take place above the dura mater, into the sac of the arachnoid, or into the substance of the brain. It generally occurs in or near the corpus striatum or optic thalamus. It is usually distinguished as *capillary hemorrhage*, or as *hemorrhagic clots*. In capillary hemorrhage the part is reddish, or of a yellow color, soft or pulpy, and dotted with minute spots of blood. These minute extravasations of blood are liable to occur in all acute cerebral inflammations, in the vicinity of an occlusion of a small artery by a clot, or as a result of disease (atheroma) of the lining membrane of the smaller vessels. Capillary hemorrhage may go on to yellow softening, to suppuration, or to the organization of the blood-clots. Microscopically, in case of organization, the effused blood be-

comes covered with a thin membrane and the contained red blood-globules are gradually replaced by colorless cells. This outer membrane is converted into connective tissue, and the cells either degenerate and are absorbed, or they are also developed into fibrinous connective tissue.

In the case of *hemorrhagic clots*, the blood is found amongst soft, or broken-up and discolored brain-substance, or it may have burst into and filled the ventricles. When the patient survives, the fluid part of the blood is absorbed, the coagulum dries up, the surrounding cerebral substance, at first torn and softened, becomes of natural consistence, and either a cyst is formed or a cicatrix alone remains. Extensive cerebral hemorrhage is usually caused by fatty or fibroid disease of the bloodvessels, by aneurisms of the arteries, or by softening of the tissue of the brain; it mostly accompanies degeneration of the kidneys and hypertrophy of the heart.

469. Whenever a substance of much larger size than a blood-cell, whether it be a vegetation on a cardiac valve or a clot in the interior of a vein, enters the circulation, it is swept onwards until it reaches a vessel through which it is unable to pass, it becomes wedged in its new position, and is termed an *embolus*. Of course this accident is most liable to occur in that part of the vascular system which the plug has first to traverse after its detachment. Consequently the vessels of the brain are most apt to be obstructed in diseases of the heart; the liver, in the affections of the organs whose blood is returned by the vena portæ, &c. The first result of an obstruction to the current of blood by an embolus is the loss of functional power in the parts thus deprived of their nutriment. Thus, paralysis takes

place when a portion of the brain has suddenly been rendered anæmic. If the circulation is restored by the blood finding its way through collateral branches no permanent injury is produced, but if such is not the case, the neighboring vessels become greatly congested and hemorrhage usually occurs (see Fig. 76). The

FIG. 76.

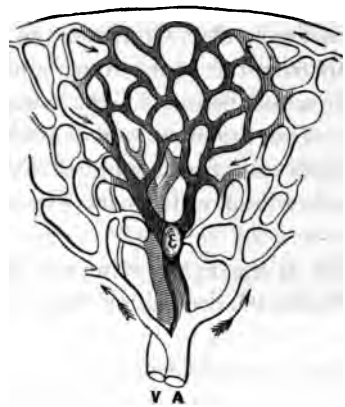


Diagram of an embolic hyperæmia (of the lung). A. Small artery occluded at E by an embolus. V. Vein filled with a blood-clot arising from the stoppage to the circulation. The arrows show the collateral routes by which the congestion is produced. (RINDFLEISCH.)

structures permanently deprived of blood either soften or suppurate. Softening takes place most frequently in the brain, because most of the emboli entering its circulation are vegetations or portions of clots washed from the heart. Suppuration is more common in the lungs and liver, on account of the clots arrested in their vessels being, for the most part, derived from veins obstructed by blood in a state of decomposition, as in the case of puerperal inflammation and dysentery.

470. TUBERCLE frequently presents itself in the

membranes of the brain, producing tubercular meningitis. In children a firm, yellow, cheesy tumor is often found in the cerebral substance, which is usually termed tubercular. Microscopically, there seem to be two different kinds of these so-called tubercular tumors. In one, which ordinarily constitutes the smaller nodules, you can distinguish numerous miliary tubercles joined together (see Fig. 75). The other presents none of the characters of real tubercle. It appears to originate in a growth of cells from the connective tissue of the brain (the neuroglia), which become cheesy towards the centre of the mass. The tumor is surrounded by a tissue composed of cells and freely supplied by bloodvessels, whilst its interior and older part presents only firm fibrous tissue.

471. GLIOMA is the name given to a form of tumor which originates in the connective tissue of the nervous substance. It affects the brain, nerves, and retina, is of slow growth, and is chiefly found in childhood. Microscopically, it consists of small, round cells, intermixed with a sparing amount of fine fibres (see Fig. 77).

472. MEDULLARY CANCER occasionally presents itself as a cerebral tumor, more rarely the firmer variety (scirrhus) is found. Such tumors may originate from the brain itself, or its membranes, from the bones, or from the orbit or other neighboring cavities.

473. SPINAL MENINGITIS, or inflammation of the membranes of the spinal cord, presents morbid changes similar to those caused by inflammation of the cerebral membranes.

474. MYELITIS, or inflammation of the spinal cord, usually ends in softening; the appearances are similar to those of cerebral softening.

475. GRAY DEGENERATION OF THE BRAIN AND SPINAL CORD.—The white substance of these organs is liable to two forms of gray degeneration—the non-inflammatory and the inflammatory. In both cases the

FIG. 77.



Section of gliomatous tumor of the brain.

gray color arises from the wasting of the white substance of Schwann, leaving intact the axis-cylinder of the nerve-fibres, which is of a grayish color.

The *non-inflammatory gray degeneration* most frequently affects the spinal cord, usually commencing at the lower part and extending upwards. It generally begins at the surface, so that a section of the cord shows the posterior columns converted into a reddish-gray material that extends inwards to a variable distance. Microscopically, there is a great increase in the amount of the connective tissue, forming a network of fine fibres, which compresses the nerve-fibres, and leads to their degeneration. The white substance of Schwann

first breaks down, but the axis-cylinder can be often recognized even at a late period of the disease.

The *inflammatory gray degeneration* is usually more limited in extent than the preceding form. It gives rise to hardness and a certain amount of reduction in the thickness of the affected parts. *Microscopically*, the external coats of the bloodvessels are seen to be greatly thickened, the connective tissue is increased in amount, and the nerve-fibres are compressed and degenerate, as in the non-inflammatory form.

476. In LOCOMOTOR ATAXIA, atrophy and degeneration of the posterior columns and of the posterior roots of the spinal nerves, sometimes of the posterior cornua of the gray matter, have been found by the microscope. The membranes are generally normal. The morbid change appears always to commence at the surface, and to spread towards the centre.

477. In WASTING PALSY, isolated parts of the spinal cord have been found in a state of degeneration. The muscular structure of the affected limbs is completely wasted; it appears pale and soft, and microscopically the fibrils seem fatty or granular.

478. The symptoms that should lead you to suspect disease in the nervous centres are,—any alteration in the mental functions or in the powers of motion or sensation, severe or long-continued pain in the head or spine, affections of the sight or hearing unconnected with structural changes in the organs through which these senses are manifested. As you have to trust chiefly to symptoms, you will find more uncertainty in the diagnosis of this class of diseases than in those before described; greater care and more minute attention to the history of each case is necessarily required.

479. One of the means of physical diagnosis that you will find useful is the ophthalmoscope, but a considerable amount of practice is required to enable you to employ it properly. The form of instrument most generally used consists of a slightly concave mirror and a double convex lens. When about to use the ophthalmoscope the patient must be placed on a chair in a darkened room, whilst you seat yourself exactly opposite, and slightly above him. A gas or other bright lamp should be placed on a level with and on the same side, but a little behind the eye you wish to examine. Supposing you are desirous of looking into the left eye, take the handle of the mirror in your right hand and adjust its central perforation to your right eye. Then throw the light from the mirror upon the eye, and vary your distance until you observe the pupil brightly illuminated. Keep the mirror in this position, and place the convex lens a little distance before the pupil. Direct the patient now to look at the wall over the tip of your left ear, and by slightly varying the distance of the lens you will soon catch a view of a retinal bloodvessel. Trace this in the direction of its increasing thickness until you see a white circular patch from which the vessel seems to emerge; this is the optic disk. The optic disk is a nearly circular, well-defined, reddish-white patch, through which the retinal arteries and veins enter the eye. The arteries are smaller and lighter colored than the veins; the main trunks of both pass upwards and downwards before dividing into branches (see Figs. 78 and 79).

480. In each case that comes before you, first observe whether there is any striking alteration in the mental condition of the patient. If so, begin at (481); if not,

then investigate the state of his powers of motion (513); if you still feel in doubt as to the nature of the disease, ascertain if there be any change in the size of the head (546), or any alteration in sensation (550). In the progress of a single case all the functions of the nervous system may be implicated, but by inquiring into the history of the disease you will generally find which has been most prominently affected.

Section I.

THERE IS AN ALTERATION IN THE MENTAL CONDITION.

481. You may find the mental powers suspended, as in coma (482), or their activity much increased, as in delirium (502). In *deep* coma the patient can neither answer questions, nor is he sensitive to light or other stimuli, the breathing is heavy, often snoring, swallowing is difficult or impossible. In delirium the mind is in a state of intense activity, the patient is constantly talking in a rapid, rambling manner, ever changing his position, and often so violent as to require restraint.[1]

A. You find suspension of the mental faculties.

482. Under this head you may have apoplexy, sunstroke, catalepsy, tubercular meningitis, convulsions, and epilepsy. In the first three of these the loss of consciousness is generally rapid; epilepsy attacks the patient only from time to time. In typhoid fever, men-

[1] I do not here enter on the subject of insanity, as the student is not likely to meet with such cases in the wards of a general hospital.

ingitis, and many other complaints, loss of consciousness occurs towards the termination of the case, and the diagnosis must be determined by the history of the disease.

483. *a.* The patient suddenly falls into a state of stupor, the pupils of the eye are dilated, the respiration is laborious and snoring, the swallowing difficult, the power of the limbs is lost; the pulse slow, sometimes irregular and intermitting. The urine is retained, or both fæces and urine are passed involuntarily.

The disease is *apoplexy.*

484. Apoplexy is often preceded by headache, giddiness, and vomiting, or by difficulty in speaking, numbness or palsy of the limbs or face, or by affections of the eyesight or bleeding at the nose. The loss of consciousness during the attack varies greatly in degree. It may be very slight and temporary, or it may be profound and remain unaltered until death. The pupils are often unaffected, in some cases they are dilated, in others contracted.

485. Apoplexy may arise from congestion of the brain (*congestive*), the rupture of a bloodvessel in the brain or its membranes (*sanguineous*), or from serous effusion, which, in most cases, depends on disease of the kidneys. When it is the result of congestion, the patient has usually been affected before the fit with nausea, giddiness, dull pain of the head, sleepiness, and inactivity of the body and mind; in case of recovery the duration of the fit is short, the intellectual powers are soon regained, and no paralysis of the limbs or speech remains. In disease of the kidneys you have frequently convulsions, the attack is more gradual than in the other forms, there is often no snoring, and the urine contains albumen. If the fit has been produced by hemorrhage into the sub-

stance of the brain, there is generally hemiplegia, recognized during profound coma by the twisting of the mouth and the loss of power in the limbs of one side; the attack is often not preceded by premonitory symptoms, the mental power in case of recovery is slow in returning, and paralysis of one side of the body generally remains.

486. In hemorrhage into the ventricles there is profound coma, with general paralysis and rigidity of the muscles. When the bleeding occurs into the arachnoid the symptoms are similar to those of ventricular hemorrhage, but are often accompanied by severe convulsions. Rigidity or tonic contraction of the muscles is a sign of extensive hemorrhage with laceration of the substance of the brain. When hemorrhage has taken place into the pons Varolii, the pupils may be contracted instead of being dilated, and there may be at first neither stertor nor paralysis.

487. Coma may be produced by an injury to the brain, uræmia, or poisoning by spirits or opium, as well as by cerebral congestion and hemorrhage. When you have a clear history of the case, you ascertain if there had been any accident, or if the patient had been affected with kidney disease, or had been drinking to excess, or had previously suffered from an attack of paralysis, or from any of the premonitory symptoms of apoplexy. But where, as often happens, the person has been discovered in a state of insensibility, and no account of his previous condition can be obtained, you first examine carefully the face and scalp for any marks of injury, and the ears for blood. Next, observe if the mouth is twisted, or either side of the body is paralyzed; if such be the case, a local lesion of the brain is indicated, and if there is no evidence of an accident, you may diagnose hemor-

rhage of the brain or its membranes. If local paralysis is absent, see if the tongue has been bitten, as the occurrence of convulsions limits the causes of the attack to hemorrhage, epilepsy, and uræmia. In this case examine the urine for albumen. When the coma has been produced by excess in spirits, the face is usually flushed instead of pale, the pulse quick, the breath smells of spirits, the patient can be often roused to answer questions, the loss of motor power is seldom complete, and there are no convulsions.[1] In opium poisoning the pupils are contracted, there is no stertor, and the coma gradually deepens. As, however, the pupils are often partially contracted, and the coma very deep in hemorrhage into the pons Varolii, the diagnosis may be almost impossible, if there is no history of the attack. Remember in all doubtful cases to use the stomach-pump.

488. Inflammation of the retina is very common in kidney disease (236), and examination with the ophthalmoscope may therefore prove useful in diagnosis. In the early stage the retinal veins are full, dilated, and tortuous, and extravasations appear in different parts, the optic disk is hyperæmic or bluish-gray from serous infiltration. At a later stage the optic disk becomes swollen, and its outline is gradually merged into the retina, white spots or patches appear at a little distance from the disk, or they form a broad, glistening, white

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[1] "Dr. Anstie tells me that it would be possible to recognize the presence of a *poisonous* dose of alcohol in the system, if *one* drop of the urine itself, added to 15 minims of the chromic acid solution, turned the latter *immediately* to a bright *emerald* green. The chromic acid solution is made by dissolving one part of bichromate of potash in three hundred parts by weight of strong sulphuric acid." (Dr. Hughlings Jackson.)

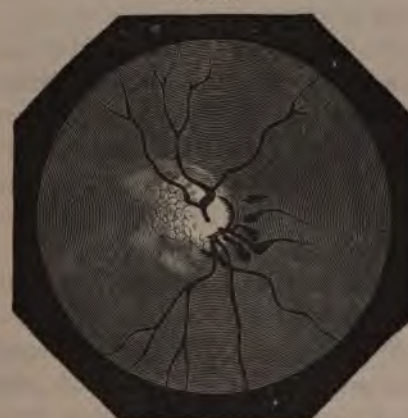
mound around the disk. These appearances are shown in Fig. 78.

489. *b*. After exposure to the heat of the sun the patient becomes unconscious, the face is pale, the pupils are contracted, the breathing is snoring, the pulse is frequent, feeble, and often intermitting.

The disease is *sunstroke*.

490. This disease is rare in this country. It is usually preceded by loss of flesh, sleeplessness, giddiness, heat and dryness of skin, frequent desire to pass water, and in some cases by convulsions. In case of recovery it is not followed by paralysis, but the attack very often leaves

FIG. 78.



"A case of retinitis in albuminuria. The optic disk was ill-defined; the vessels were large and tortuous; on the apparent inner side were several small ecchymoses, evidently proceeding from the retinal vessels. On the apparent outer side was a hazy circle, indicating subretinal effusion, and at several points were white spots." (POWER.)

persistent headache, inability for mental exertion, giddiness, and in some cases it is followed by epileptic attacks or insanity.

491. *c*. The patient, usually a female, appears to be

unconscious, the eyes are open, the body is rigid, and the limbs remain fixed in any position in which they may have been when the patient was attacked, or in which they may be placed by others during the seizure. The pulse and respiration are natural, and are very feeble.

The disease is *catalepsy*.

492. This complaint is very rare, and is generally connected with disordered uterine functions. The attacks may continue only for a few minutes, or they may last for hours; they usually follow a severe mental shock, are never ushered in by convulsions, nor are they followed by paralysis. A modified form of this complaint is sometimes observed in persons of either sex affected with softening of the brain.

493. *d.* The patient (a child), after having suffered from the symptoms of tubercular meningitis, gradually sinks into a state of unconsciousness; the eyes are dull and heavy, or squinting, the pupils dilated, the fontanelle is convex and prominent, the respiration often sighing, the pulse slow, sometimes irregular, but becomes more rapid when the child is raised up in bed.

The disease is *tubercular meningitis* (*acute hydrocephalus*).

494. In very young children the first symptoms that attract notice are generally vomiting and constipation of the bowels; the eyebrows are contracted, the head is hot and drawn backwards, the pulse is quick, the child is fretful and suddenly screams as if in severe pain; he turns from the light, starts at any unusual sound, is unwilling to be roused, and the respiration is often sighing. Older children complain from the first of severe pain in the head, and, not unfrequently, the disease in them is ushered in by convulsions. As the complaint advances

to its close the coma deepens, and either the patient sinks from exhaustion, or is cut off by convulsions. Tubercular meningitis is almost always preceded by loss of flesh, unwillingness for exertion, loss of spirits, cough, and other signs of failing health, for some weeks or even months before the attack comes on. It will be generally found that the malady affects those who belong to families, some members of which have suffered from enlargement of the lymphatic glands (scrofula) or consumption.

FIG. 79.



Representation of the appearances seen with the ophthalmoscope in a case of tubercle of the choroid. *a*. Tubercle in the choroid. *b*. Artery of the retina. *c*. Veins of the retina. *d*. Optic disk. (BOUCHUT.)

495. Tubercular meningitis occasionally attacks adults who are suffering from phthisis. Severe shooting pains of the head, accompanied by fever, delirium, and vomiting, are usually the first symptoms that attract attention. It must be remembered that constipation in these cases is often absent on account of the coexisting tubercular disease of the intestines.

496. Acute hydrocephalus may be simulated by a

state of exhaustion produced by diarrhœa or insufficient feeding. In this condition (*hydrocephaloid disease*) the child is insensible, but the fontanelle is depressed, the head is cool, the face pale, and the bowels are usually purged.

497. The ophthalmoscope may be used in the diagnosis of both acute and chronic meningitis. In tubercular meningitis, it is said that the optic disk is œdematous, the retinal veins are dilated, extravasations take place, and in some cases, small, circular, prominent tubercles may be distinguished in the choroid (Fig. 79). In chronic meningitis, it is stated that you may meet with serous infiltration of the optic disk, hemorrhages, and fatty exudations.

498. *e.* The patient is subject to attacks, in which he falls suddenly to the ground in a state of unconsciousness; the face is distorted, the pupils dilated, the limbs are violently convulsed, the lips blue, froth issues from the mouth, and the tongue is often bitten; the pulse is sometimes scarcely perceptible.

The disease is *epilepsy.*

499. The attacks seldom last more than a quarter of an hour, and are succeeded by a deep, heavy sleep. During the intervals the patient may be in good health, but the mind usually becomes gradually enfeebled, and he displays a want of physical and mental energy.

500. Epilepsy may arise from disease of the brain, or from syphilis, or it may be produced by irritation in some other organ; it is often hereditary, and a fright not unfrequently gives rise to the first seizure. The attacks are occasionally preceded for a few seconds by a sensation (termed the "aura") originating in some part of the body or limbs, and rising to the head; in other

cases by giddiness, headache, or a twitching movement of a limb. Usually the first symptoms are a shrill cry and a twisting of the neck to one side, accompanied by distortion of the features. In some the unconsciousness lasts only for a few moments, the patient does not fall, and there are no convulsions (*epileptic vertigo*). Occasionally, the fits are followed by violent delirium, or by a loss of power in one side of the body (hemiplegia).

501. Epilepsy may be simulated by hysteria, but in the latter the unconsciousness is less complete, the patient is sensible to the dashing of cold water on the face, the convulsions are, at any rate to a great extent, under the control of the will, they do not occur during the night, and the tongue is not bitten. Also, during the intervals of the attacks, the patient is liable to palpitation, pain of the left side, choking in the throat, or paroxysms of laughing and crying.

B. The patient suffers from delirium.

502. Remember that some amount of delirium, especially at night, is common whenever there is much fever. Thus it often presents itself in the inflammation of any important organ; in young persons a temporary state of delirium may arise even from dyspepsia, or it may be induced by narcotics, such as Indian hemp. Always most carefully examine the condition of the heart and lungs, for it often happens that when inflammation of these organs coexists with delirium, the other symptoms are masked by it.

503. In the following complaints delirium is a prominent symptom, lasting for some time, and continuing both day and night—typhoid (585) and typhus fever (581), acute meningitis and delirium tremens; all are acute disorders.

504. *a.* Along with delirium, often of a furious character, the patient complains of acute pain of the head, aggravated at intervals; there are intolerance of light and sound, contracted pupils, inability to sleep, great restlessness; the face is flushed, the conjunctivæ red, the head hot, the pulse quick and hard, the tongue coated, all food is vomited as soon as taken, and the bowels are confined.

The disease is *acute meningitis.*

505. In the early stage the patient is attacked by rigors, followed by headache and vomiting, a hot dry skin, and fever. If the complaint is about to terminate fatally the headache lessens, twitchings or convulsions come on, the patient becomes comatose, the pulse is small and thready, the tongue hard and brown. Acute meningitis may arise from injuries to the head, spirit-drinking, syphilis, excessive care or anxiety. It is often produced by disease of the ear or nose, and therefore in every case examine these organs very carefully. Acute tubercular meningitis in children has been already described (493).

506. Typhoid fever is known from meningitis by the relaxation of the bowels, the smaller amount of headache, the absence of vomiting, the eruption of the skin, the slowness of the development of the complaint. In typhus fever you have muttering, not furious delirium, the strength is from the first prostrated, and the characteristic eruption presents itself. Acute mania differs from meningitis in the cleanness of the tongue, in the absence of headache, thirst, and vomiting, and in the smaller rapidity of the pulse. The indications given by the thermometer are of very great value in the diagnosis of fevers.

507. *b.* In addition to delirium the patient is exceedingly restless and unable to sleep; he has hallucinations of the senses (he sees animals, such as beetles, mice, &c.), his hands tremble, the face is pale, the skin is covered with perspiration, the pulse feeble and quick, and the tongue is moist and creamy. His history shows that he has been in the habit of drinking to excess.

The disease is *delirium tremens.*

508. The chief difficulty in diagnosis is between this disease and meningitis, for the latter may also arise from drunkenness, although it is, in comparison with the former, very rare. You distinguish them by the severe headache, the hard quick pulse, the heat of the head, and the raving of meningitis.

509. A form of delirium tremens occurs in persons whose occupation exposes them to lead poisoning. In such you will find a blue line on the gums round the teeth, they have generally suffered from lead colic, or palsy, and the delirium is chiefly at night.

C. The patient suffers from gradual diminution of his mental powers.

510. Under this head you may meet with chronic softening of the brain, chronic meningitis, and paralysis of the insane (524).

511. *a.* The intellect has been gradually impaired, especially the memory of recent events, the temper is irritable, the face dull and expressionless, there is a tendency to laugh or cry on the least emotion; headache and giddiness are often present.

The disease is *chronic softening of the brain.*

512. This complaint frequently follows hemorrhage into the brain or acute softening. It may also arise from disease or obstruction of the bloodvessels by plugs of

fibrin, from general debility, excessive mental effort, tubercular or others tumors, epileptic attacks, congestion of the brain, or syphilis.

513. In *chronic meningitis* you have nearly the same symptoms as in softening of the brain; but there are more headache, irritability of temper, depression of mind, and occasional delirium. It is not preceded or accompanied by palsy, and there is usually a history of some injury to the head, rheumatism, or syphilis.

Section II.

THE PROMINENT SYMPTOMS ARE THOSE OF ALTERATIONS IN THE POWER OF MOTION.

514. The muscular power may be diminished or lost (paralysis) (515); or it may be increased and involuntary (536).

A. You have diminution or loss of muscular power.

515. You ascertain the loss of muscular power in different ways. Direct the patient to move the palsied part, and the muscles are seen to obey his will imperfectly or not at all; thus, one side of the face being paralyzed, you ask him to laugh, and you will see the mouth drawn to the opposite side. In some cases you test whether the reflex action is intact, as, for instance, by tickling the sole of the foot and observing if the leg is drawn up involuntarily. In others you apply electricity to ascertain if the muscles are able to respond to that stimulus. Always remark whether, with the palsy, there are any cramps or contractions of the muscles,

and if so, at what stage of the disease they have occurred.

516. Sensation is often impaired when the power of motion is defective. You ascertain this by inquiry, or, for greater exactness, you measure with a pair of compasses the smallest distance to which the points can be separated whilst the patient is sensible of the contact of both. The muscular sense may be impaired although the sensibility of the skin is perfect. In this case the movements of the part affected are awkward and irregular, and can only be performed when the will is strongly directed to the object, or when the muscles are assisted by the eyesight.

517. In the following diseases the loss of motor power is a prominent symptom, and arises from an affection of the brain—hemiplegia, tumor of the brain, and paralysis of the insane; the next two are connected with disease of the spinal cord—paraplegia, and locomotor ataxia.

518. *a.* The patient is paralyzed on one side of the face, tongue, and body; the face is drawn to the opposite side from that palsied, speech is generally imperfect, and the tip of the tongue when protruded is pushed to the affected side.

The disease is *hemiplegia.*

519. This complaint generally comes on suddenly. It is often preceded by symptoms of apoplexy; in other cases there is sudden loss of speech and power of motion without the consciousness being affected. The patient may gradually recover, or the attack may be followed by softening of the brain. The arm is the latest part to regain its power.

520. Hemiplegia may follow chorea, epilepsy, hysteria, softening, abscess, tumor of the brain, or hemor-

rhage. In chorea the loss of power is preceded by the peculiar muscular twitchings of that disease. The hemiplegia of epilepsy follows a fit, usually soon disappears, but is apt to return after each convulsive attack. In hysterical palsy the face or speech is seldom affected, the whole side is not equally paralyzed, and the patient exhibits other symptoms of hysteria. When softening has produced the hemiplegia, there is usually no loss of consciousness, and the muscles of the affected parts are relaxed: the attack has been preceded by giddiness, headache, impairment of the mental powers, or irritability of temper; the heart is generally feeble, and in young persons its valves are often found to be diseased. When hemorrhage has taken place in the brain, there is a loss of consciousness at the commencement of the palsy which occurs when the patient seems in good health, the muscles of the affected limbs are often contracted, and you will frequently discover either evidence of granular disease of the kidneys, or the hard thickened feeling of the artery at the wrist and a white ring surrounding the cornea will show that the arteries of the brain are probably diseased. After the first shock is over, the condition of the mental faculties and the articulation soon improve if the attack has been caused by hemorrhage, but in cases of softening, the mind remains enfeebled, and recovery in other respects is slow. Hemiplegia not unfrequently results from the obstruction of some of the cerebral arteries by clots or vegetations that have been detached from diseased valves of the heart, and swept into the circulation.

521. You may have an imperfect form of hemiplegia from congestion of the brain. Sometimes hemiplegia is preceded by loss of power in the parts supplied by par-

ticular nerves, as the tongue or eyelid. Paralysis of the portio dura often occurs from cold, but in this case the patient is unable to close the eyelids from loss of power in the orbicularis, or to wrinkle the forehead, and the muscles do not respond normally to electricity as they do in the palsy of cerebral origin.

522. The extent of the paralysis varies according to the nerves affected. If the third nerve is implicated there is drooping of the upper eyelid, dilatation of the pupil, and an outward squint; if the fifth, the muscles of mastication act less forcibly on the affected than on the opposite side; difficulty in swallowing shows that the disease has implicated the vagus and glosso-pharyngeal nerves. When the affection has occurred above the pyramids, where the motor nerves decussate, the palsy takes place on the side of the face and body opposite to that which is injured. In some rare cases, disease attacks the cord just below the decussation, and then the palsy is on the same side as the disease, and the nerves of the face are not affected.

523. The muscles of the palsied limbs may be relaxed at the time of the attack, as in softening of the brain; or contracted when the nervous matter is irritated by a clot; or the muscles, at first relaxed, may subsequently become contracted, from inflammation or irritation set up during the cicatrization of the injured parts of the brain. In long-standing cases the limbs may, however, become contracted from changes in the muscles and tendons of the parts affected.

524. *b.* The patient, with symptoms of disordered intellect, gradually loses the powers of sensation and motion, his lips and tongue are tremulous, and he is unable to pronounce his words, or does so imperfectly.

The disease is *paralysis of the insane.*

525. In some cases the mental changes are not well marked in the early stage, and the difficulty of articulation and the gradual paralysis chiefly attract attention. Atrophy of the optic nerve is often present.

526. In atrophy of the optic nerve there is "a pale, white, or bluish-white discoloration of the papilla, diminution in the calibre and number of the little nutritive bloodvessels upon the expanse of the disk, attenuation of the retinal vessels, more especially the arteries, and frequently a peculiar excavation of the optic nerve."[1]

527. The student must remember that the powers of motion, of sensation, and of the co-ordination of muscular action in the limbs, depend on the integrity of the spinal cord. In the following diseases these functions are affected.

528. *c.* The patient has an awkward, unsteady gait, the feet are thrown outward and forward, the heels first coming to the ground; when his eyes are closed he staggers and tumbles; when sitting he can move his legs strongly; sensation in the affected limbs is very imperfect. He gradually loses his powers of motion and sensation; the arms are usually affected at a later period than the legs.

The disease is *locomotor ataxia.*

529. The patient is first attacked with wandering, sharp, piercing pains of the limbs, occurring in paroxysms; often with double vision and unequal contraction of the pupils. There is sometimes, but not always, imperfection in the powers of the bladder or rectum. The disease is always very slow. There is occasionally atro-

[1] Soelberg Wells "On Diseases of the Eye."

phy of the optic nerve, but this seldom occurs in the early stages.

530. *d.* After slight numbness or altered sensation in the legs and feet, a loss of motion and sensation is experienced in both the lower limbs. The patient drags his legs when walking, or loses all power over them, and also over the bladder and rectum, but involuntary startings of the limbs are often present. When confined to bed, bed-sores are apt to form.

The disease is *paraplegia.*

531. The extent of the palsy depends on the amount of disease in the cord; only the lower limbs, or both the upper and lower may be affected, according to the seat of the lesion. The urine is generally ammoniacal, and deposits a thick ropy mucus. Paraplegia may arise from hysteria, disease of the urinary organs, softening of the spinal cord, or tumors, &c., compressing the cord. In hysteria the paralysis is seldom complete, it varies greatly in amount at different periods, and other hysterical symptoms are present. In diseased kidneys or bladder the affection of the urinary organs has preceded the palsy. Occasionally inflammation of the spinal cord occurs as an acute affection, but generally it is of slow development. In some cases the affection of the cord arises from disease of the vertebræ, or their cartilages; therefore examine if there is curvature of the spine, or if pain is produced by a smart shock upon any portion of it, or by the application of a sponge wrung out of hot water. Also inquire if the patient has suffered from any accident shortly before the first appearance of the symptoms.

532. You distinguish locomotor ataxia from paraplegia by the characteristic pains of the limbs and the

affections of the sight that generally accompany or precede the former, by the functions of the bladder not being so much affected in it, and by the muscular power of the limbs being intact when the body is in the sitting position.

533. *e.* Weakness of some muscle or group of muscles gradually takes place (usually the ball of the thumb or the deltoid is first affected), followed by their wasting and gradual disappearance; the sensibility of the parts is not impaired; vibrations of the enfeebled muscles are often observed.

The disease is *progressive muscular atrophy.*

534. The course of this disease is generally very chronic (9 months to 5 or 6 years), and life is often destroyed by the muscles of respiration becoming implicated.

535. You may have local paralysis from other causes. Thus, the throat is sometimes palsied after diphtheria, or the upper eyelid or even the whole side of the body may suffer in this way in children from the irritation of teething. Workmen in lead are liable to palsy of the extensor muscles of the forearm, but the peculiar dropping of the wrist, the discovery of the blue line round the gums, the previous existence of colic, and the nature of the occupation, will in such cases direct your diagnosis.

B. You find increased and involuntary muscular action.

536. When this affects only a part of a limb it is named *spasm;* when excessive and involuntary muscular action is general and attended with unconsciousness it is called *convulsion.* Spasms, again, may be "*tonic*" —that is, continuous; or "*clonic*"—that is, alternating

with intervals of relaxation. Convulsions occur at all ages, and in different diseases. Children are most liable to them, and at an early period of life they often usher in eruptive fevers, or they may be produced by teething, worms, or other causes of irritation. They also occur in various diseases of the brain.

537. In the following diseases, the whole or large portions of the muscular system is affected with increased and involuntary action,—tetanus, hydrophobia, and chorea. In paralysis agitans, mercurial tremor, and writer's cramp, the complaint is usually of a local character.

538. *a.* The muscles of the body are stiff and rigid, the features retracted into a characteristic grin, painful spasms occur at frequent intervals, severe pain is experienced shooting from the epigastrium to the back, the intellect is unimpaired.

The disease is *tetanus.*

539. Tetanus generally follows some injury, although it sometimes occurs idiopathically. The first symptom is stiffness about the back of the neck and jaw, whence it spreads over the whole body. The pulse is quick and small, the bowels confined, thirst and fever are generally present; the temperature is always unusually high, in some cases even 110° just before death. When the spine is arched backwards by the strong action of the muscles, so that the body rests on the head and the heels, the condition is termed *opisthotonos;* when it is bent in the opposite direction *emprosthotonos;* when the curvature takes place laterally it is named *plerosthotonos.* An overdose of strychnia produces similar symptoms; but the spasms come on suddenly, they affect the whole

body at once, and are in paroxysms, not continuous as in tetanus.

540. *b.* There is violent spasm of the throat on attempting to swallow, a horror of liquids, great restlessness, want of sleep, often maniacal excitement. The pulse is feeble, the skin covered with sweat, and the saliva is secreted in increased quantity. The patient has some weeks or months previously been bitten by a dog or cat.

The disease is *hydrophobia.*

541. This disease is rare, and is generally readily recognized by the patient's dread of drinking.

542. *c.* The muscles are affected with a jerking, painless, involuntary motion; the tongue is projected from the mouth with a jerk and as suddenly withdrawn; the limbs cannot be kept at rest, the muscles of the face twitch, the speech is often hesitating.

The disease is *chorea.*

543. The hands and arms are generally first affected, and often to a very slight degree, but the unsteadiness gradually extends to other parts. Occasionally only one side of the body is attacked, but generally both. In many cases there is a murmur at the mitral valve. The urine is often of high specific gravity, and contains an excessive amount of urea. This disease seldom attacks persons above twenty years of age, and is most common in females. Dr. Hughlings Jackson believes that it is produced by embolism of the cerebral capillaries.

544. *d.* The parts affected are continually shaking; at first the muscles can be steadied by an effort of the will, but afterwards their motions are beyond control.

The disease is *shaking palsy.*

545. When the hands are attacked the power of writing is lost; when the neck suffers the head is constantly shaking, and eventually droops. In many there is a tendency to stoop, and they are obliged to run when they attempt to walk. It chiefly affects old persons.

546. *Mercurial tremor* is a trembling form of palsy that affects persons whose occupations oblige them to use mercury. *Writer's cramp* is a painful cramp affecting the hands and fingers of clerks whenever an attempt is made to use a pen. It probably arises from over-action of the muscles.

Section III.

YOU FIND THE HEAD MUCH INCREASED IN SIZE.

547. There are only two diseases in this class, viz., chronic hydrocephalus, and hypertrophy of the brain.

548. *a.* The skull is much increased in size, especially at its upper part; the fontanelles are often unclosed, the eyes protrude and are directed downwards.

The disease is *chronic hydrocephalus.*

549. In the early stage the child may appear in perfect health, but, as the disease progresses, it becomes irascible, feeble in body and mind, and subject to convulsions. Nutrition is impaired, the patient is usually unable to walk, the senses are dull, and in some cases convulsions occur. The disease usually begins in children below six months of age.

550. *b.* Hypertrophy of the brain is a rare affection, in which, excepting the increased size of the head, there are at first no prominent symptoms. The enlargement

begins at the occiput, and the eyes remain deep; there is no prominence of the fontanelles.

SECTION IV.

YOU FIND THAT THE PATIENT SUFFERS FROM SEVERE PAIN OF THE HEAD WITHOUT FEVER, THE INTELLECT AND POWER OF MOTION BEING UNAFFECTED.

551. Headache may arise from dyspepsia, rheumatism, neuralgia, chronic disease of the brain.

552. Dyspeptic headache is recognized by the pain being aggravated after food, or accompanied by obstinate constipation, bilious vomiting, acidity, or other signs of disordered digestion. In rheumatism, the scalp is tender, and the patient has usually suffered from the complaint elsewhere. If the pain is nocturnal, and there are tender swellings on the head, it is probably caused by syphilis, and you must inquire into the previous state of the patient's health. Neuralgia is chiefly felt in the course of some of the nerves of the face or head, and the pain is liable to periodical exacerbations; the most common seat of the pain is the temple, and you will then often find disease of the teeth or gums. Sometimes you will be able to trace the complaint to gout or ague. Various chronic diseases of the brain and its membranes are attended with pain, but they must be diagnosed by their other symptoms.

553. Tumors of the brain are often very difficult of diagnosis, the symptoms varying according to their nature, size, and position. As a general rule, they are attended with severe, constant pain, confined to one part

of the head, and by paralysis of one or more of the cranial nerves gradually coming on and slowly progressing. The optic nerves are most frequently affected, but deafness, or loss of smell or taste may present itself; the third nerve is also very generally implicated. In other cases attacks of vomiting, giddiness, or epileptic seizures form the most prominent symptoms. Similar symptoms may, however, be produced by abscess, softening, or other local diseases of the brain. You should therefore inquire if the patient has suffered from any accident to the head, discharge from the ears or nose, or has any valvular disease of the heart.

554. If a young and apparently healthy person has suffered for some months from intense headache attended with attacks of urgent vomiting, and if by the ophthalmoscope you ascertain the presence of *double optic neuritis*, it is probable that he has a tumor in some part of the brain. The diagnosis will be strengthened, if there be also paralysis of the whole of one or more cranial nerves.

555. You cannot determine the nature of a cerebral tumor by the symptoms it produces, but it is well to remember that tubercular tumors are chiefly confined to children, glioma is most liable to occur in children and young persons, whilst cancer is rarely met with except in those advanced in life.

556. Syphilis affects the brain and spinal cord, either by producing disease of the coats of the arteries, or by the formation of tumors. As results of these morbid changes, you meet with paralysis either of the whole side (hemiplegia), of the lower limbs (paraplegia), or of one or more of the cranial nerves; in other cases epileptiform convulsions occur. When a *young* person who

has suffered from syphilis, and who has neither disease of the heart nor kidneys, is attacked with hemiplegia, you are justified in concluding that the disease is syphilitic. "With regard to palsies of the cranial nerves our impression is that the suspicion is greatest when the fifth is involved; next when the portio dura nerves—especially if there be also complete deafness without discharge from the ear; next the third, then the sixth, and lastly the eighth and ninth. If several of the nerves are involved, one after another, or at the same time, the suspicion is greater still, and all the more if the palsies be limited to one side. Convulsions of any sort may be due to syphilitic disease of the brain. But syphilis is most frequently associated with fits which begin by spasm in one hand, one foot, or one side of the face, and which are not followed by hemiplegia for a varying time."[1] As patients often deny they have suffered from syphilis, you should always examine in suspected cases for nodes on the head and skin, holes in the palate, the presence of a coppery rash upon the skin or the results of iritis.

The changes in the eye, as observed by the ophthalmoscope in tumors of the brain, are either produced by optic neuritis or by atrophy of the optic nerve. In many cases the patient has no diminution in the powers of vision, so that the ophthalmoscope should be employed in all cases where "coarse" cerebral disease is suspected.

"According to Von Graefe, the engorged papilla is chiefly distinguished by great, but perhaps partial swelling and prominence of the disk, numerous and considerable hemorrhages on and around the papilla,

[1] Dr. Hughlings Jackson "On Syphilitic Affections of the Nervous System," Medical Times and Gazette, May 23, 1862.

and great dilatation, darkness, and tortuosity of the veins; the arteries being, on the contrary, very small, attenuated, and often almost bloodless. The inflammatory infiltration of the retina is confined to the close vicinity of the nerve entrance.

"The ophthalmoscopic symptoms which especially characterize atrophy of the optic nerve are a pale white or bluish-white discoloration of the papilla, diminution in the calibre and number of the little nutrient blood-vessels upon the expanse of the disk, attenuation of the retinal vessels, more especially the arteries, and frequently a peculiar excavation of the optic nerve."[1]

557. The following table will be found useful in giving the student a clear idea of the seat of the lesions of the brain and spinal cord in cases of paralysis:

Tabular View of the Seat of Lesion in Paralysis due to Injuries or Diseases of the Brain and Spinal Cord (chiefly from Dr. Brown-Séquard).

Symptoms.	Seat of Lesion.
Paralysis of the facial nerve (portio-dura) without deafness or anæsthesia (Bell's paralysis).	The nerve-trunk usually outside the cranium.
Partial anæsthesia (part of 5th nerve) and *partial* paralysis of other cranial nerves, as loss of smell, &c., and some forms of strabismus (squint) and ptosis (dropped eyelid).	Ditto.
Complete paralysis of any cranial nerve, particularly the whole 5th, 7th, or 8th pairs.	Almost always central; generally on the *same* side of the brain (probably *all* the cranial nerves decussate, as most certainly some do).

[1] Soelberg Wells "On the Diseases of the Eye."

Symptoms.	Seat of Lesion.
Right arm and leg paralyzed, and *right* half of face partially so (mouth *drawn* to opposite side). *Left* hemiplegia. *Vice versâ.*	*Left* optic thalamus, corpus striatum, or cerebral lobe of *left* side, or *left* half of pons Varolii, *above* decussation of facial nerves.
Right arm and *leg* paralyzed, but *left* side of *face.*	*Left* half of pons Varolii, below decussation of facial.
Right arm and leg paralyzed, but both sides of *face.*	*Left* side of pons Varolii at the *level* of decussation of facial nerves.
Right arm and leg powerless, and their *sensibility* and *heat* diminished. Temperature and sensibility of left arm and leg, &c., *increased.*	Medulla oblongata or pons Varolii on *left* side *above* decussation of anterior pyramids.
Loss of *motion* with *hyperæsthesia* and increased heat of right arm and leg, &c.; anæsthesia and loss of temperature in left arm, leg, &c.	Lesion in left side of medulla oblongata at *level* of decussation of anterior pyramids.
Right arm and leg paralyzed (as to motion), more sensitive and hotter, but *left* arm and leg cooler, and less sensitive, or quite anæsthetic.	Injury to right half of spinal cord; above brachial plexus; below decussation of anterior pyramids.
Both legs paralyzed, as to both motion and sensation. Paralysis of the sphincters of the bladder and rectum.	Both halves of spinal cord, *below* the brachial plexus.

(Dr. Woodman.)

CHAPTER XI.

FEVERS.

558. ALMOST every inflammation is attended with the symptoms of fever, viz., quick pulse, thirst, increased heat of skin, loss of appetite, scanty high-colored urine, confined bowels, and general restlessness or great weakness. In case, therefore, you meet with these symptoms, you must first examine the condition of all the principal organs, so as to find if there is any local cause sufficient to account for them. Remember that in children slight affections, such as teething or indigestion, may give rise to sharp febrile symptoms. You should not conclude, however, because you find some organ affected, that it has necessarily produced the fever, for every fever is liable to give rise to local inflammations. To arrive at a correct diagnosis you must carefully inquire into the history of each case, and discover whether the symptoms of the local disorder, or those of the fever, were first developed.

559. In the investigation of fevers you will require all the means of physical diagnosis you have already learned to employ in the diseases of each organ. In addition, the thermometer is necessary to enable you to obtain correctly the temperature of the patient. A little care is required in its use. Introduce the bulb of the instrument below the fold of the skin covering the edge of the pectoralis major muscle, and keep it in close contact with the axilla for five minutes, having pre-

viously warmed it by holding it in the hand. Read off the degree of temperature to which the mercury has risen before removing the thermometer, unless it has a self-registering scale attached to it. The observations should be taken twice in the day, from seven to nine in the morning, and from five to seven in the evening, being the most suitable times. The normal temperature of the axilla is 98.6°, and any notable deviation from this (below 97° or above 99.5°) betokens ill-health. In addition to the temperature you should record at each visit the state of the pulse, and the number of respirations the patient makes in a minute.

560. No conclusion can be drawn from a single observation of temperature in any case, unless it is supported by other symptoms. Febrile diseases exhibit certain stages or periods, which can be recognized by the course of the temperature. The most clearly marked in cases which recover are the following: 1. The *initial* or *pyrogenetic stage*, which generally begins with a shivering fit, in which the temperature is high, although the patient complains of feeling cold. In typhoid fever this stage takes four days to reach the temperature of 104°. 2. The *fastigium* or *acme*, in which the highest average temperature of the disease is attained. 3. *The period of critical perturbation*, or *stage of decrement*, which is followed by the period of *defervescence* or cooling down. This may be sudden, when it is called a *crisis*; or slower (occupying perhaps some days), *lysis*.

561. You may take the following as general rules respecting temperatures: 1. That either very high or low temperatures must be regarded as dangerous—if excessively so, they are usually fatal. 2. Very sudden changes are suspicious, and often dangerous. 3. A fresh

rise, after the temperature has begun to fall or has been stationary for some time, generally indicates a complication, or the approach of some new disease. 4. An unexpected fall usually accompanies hemorrhage, perforation of the pleura or peritoneum, or exhausting diarrhœa. 5. A considerable rise in a disease, not usually considered febrile (epilepsy, chorea, tetanus, cancer, &c.), is generally a forerunner of death.

562. It is sometimes desirable to ascertain, by chemical analysis, the rate at which the destruction of the tissues is going on. You do this by estimating the amount of urea excreted by the kidneys in the twenty-four hours. The following is the most easy method: "A measuring-tube, twelve or fourteen inches long, is provided, easily closed by the thumb, and graduated to tenths and hundredths of a cubic inch. This tube is filled rather more than one-third full of mercury, and a measured quantity (50 to 60 grains) of urine poured into it. The tube is then quickly filled to the brim with solution of hypochlorite of soda, closed by the thumb, and inverted under a saturated solution of common salt (which being heavier than the solution in the tube, prevents its escape), contained in a small mortar. The tube is allowed to stand for three or four hours, or until the volume of the nitrogen ceases to increase, and the amount of urea is calculated (1.549 cubic inches of nitrogen gas representing 1 gr. of urea). In this process the carbonic acid is retained by the excess of chlorite of soda employed. To prepare this solution of hypochlorite of soda, 500 grs. of good chloride of lime (bleaching powder) are stirred with boiling water, filtered, and the residue washed once or twice with the boiling water; 1000 grs. of crystallized carbonate of soda

are dissolved in a little water, and added to the solution, which is then filtered and made up to 20 oz. with water."[1]

563. Having ascertained that the febrile symptoms under which the patient labors are not dependent on any local disorder, examine if there is any well-marked eruption on the face, body, or extremities. If such is the case, and the spots have appeared within the first four days of illness, begin at (564). If the eruption has appeared at a much later date, or if, without any rash upon the skin, the symptoms of the fever have been continuous, pass on to (581). If there is no eruption, and the fever recurs at regular periods, subsiding in the intervals, pass on to (598).

Section I.

THE FEVER IS ATTENDED WITH A WELL-MARKED ERUPTION ON THE SKIN, WHICH HAS APPEARED WITHIN THE FIRST FOUR DAYS OF THE ILLNESS.

564. Under this head you meet with,—scarlatina, measles, erysipelas, small-pox, chicken-pox. These fevers are all infectious, and there is a period between the exposure to infection and the onset of the fever termed "the stage of incubation." The first appearance of the illness is usually sudden and attended with shivering, which is followed by a train of symptoms peculiar to each disease. This stage is termed the "febrile stage," and is terminated by the appearance of the eruption ("the eruptive stage"), which declines after a certain

[1] Bowman's "Medical Chemistry."

number of days. As a general rule, a person can only once in his life be attacked by each of these diseases. In the diagnosis of these complaints you must not only observe the eruption, but you should ascertain the nature of the symptoms preceding its appearance, also whether the patient had been exposed to infection, and from what eruptive fevers he had previously suffered.

565. *a.* On the fourth day of the illness there has appeared, first on the face and neck, but afterwards over the whole body, an eruption of raised, red spots, which coalesce, and form slightly elevated blotches of a crescentic shape; the tongue is coated, the fever high. The eruption was preceded and is accompanied by discharge from the nose, redness and swelling of the eyes, cough, and quickness of breathing.

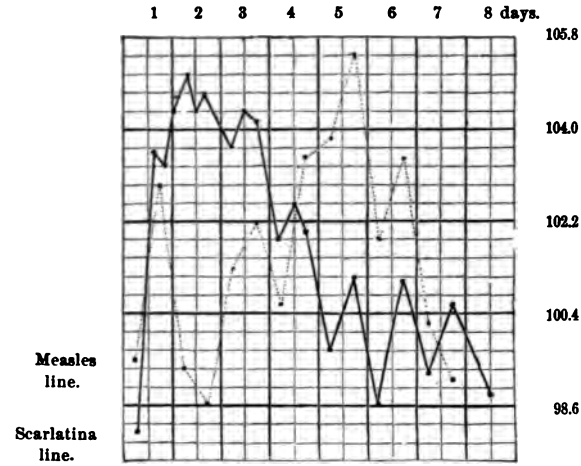
The disease is *measles.*

566. The period of incubation is ten to fourteen days. Convulsions sometimes precede the eruption, and occasionally bleeding at the nose is observed. The cough and other chest symptoms are not generally relieved on the appearance of the rash. The temperature rises rapidly at first, and then falls again before the eruptive elevation of temperature (see Fig. 80). The highest temperature in ordinary cases is 103°; if it rises above this, the case will be probably severe; if much below, it will be a mild attack; the maximum of temperature is generally on the fifth day, after which it rapidly falls; the rash disappears on the fifth or sixth day after its coming out, and is succeeded by bran-like desquamation of the skin.

567. Measles may exist without catarrhal symptoms. Capillary bronchitis, pneumonia, and diphtheritic inflammation of the larynx are the chief causes of danger during the attack; but phthisis, diphtheria, diseases of

the bones and glands and chronic ophthalmia, are sometimes induced by the complaint. The papillæ of the skin appear to be first and principally affected, and it is from this circumstance that the eruption first shows itself in the form of raised, red spots. There are two varieties

FIG. 80.



The above figure shows the course of the temperatures in an attack of measles, and in one of mild scarlatina. (WUNDERLICH.)

of measles, the slight and severe; in the latter the eruption is of a dark-purple color, the pulse is quick and feeble, the tongue brown, and the patient is apt to sink from exhaustion.

568. *b*. On the second day of the fever there has appeared on the face and neck a diffused scarlet rash, which extends over the whole body in twenty-four or thirty-six hours. The throat is inflamed, the tonsils enlarged and often ulcerated; the pulse very rapid, the skin hot and dry, the tongue at first coated, with red tip

and edges and red elevated papillæ, afterwards it is clean and raw-looking. The eruption is generally preceded in children by vomiting.

The disease is *scarlatina.*

569. The period of incubation is from four to six days. The febrile stage is usually ushered in by shivering, but occasionally delirium and convulsions appear. The eruption usually declines on the fourth or fifth day, and is followed by peeling of the skin, especially of that covering the hands and feet. The temperature rarely rises above 105°, but it may nearly reach that height on the first day of the eruption. It at first rises rapidly and continuously until the eruption appears; its fall is very gradual, and occupies five or six days (see Fig. 80). It is generally at its maximum on the third day of the fever, from the third to the ninth it ranges between 103.8° and 102.9°, and subsides between the tenth and twelfth day, unless the throat be severely affected, when it may be indefinitely prolonged. The pulse falls along with the temperature. The danger in the early period of scarlatina is generally in proportion to the severity of the throat affection, but life may be destroyed by *malignant* scarlatina at the very outset of the disease.

In fatal cases the microscope shows the rete mucosum of the skin to be much thickened, and to contain a large number of newly-formed nucleated cells. The epithelium of the sweat-glands is often so much increased as to block up their cavity. In other cases both the rete mucosum and the sweat-glands are stained with blood, arising from hemorrhage having occurred into these structures. A similar state of inflammation is present both in the stomach and intestines. The gastric tubes are distended with cells and granular matters (see Fig.

64), and, in many cases, membranous "casts" of the tubes are found in the contents of the stomach. The tubes of Lieberkühn are also choked with epithelium and the mesenteric glands are generally enlarged.

After the cessation of the fever, and usually from the tenth to the twentieth day, the patient is liable to acute nephritis, indicated by bloody or albuminous urine and dropsy of the body and limbs (228) and sometimes associated with convulsions or hydrothorax. In other cases scarlatina gives rise to acute rheumatism, discharge from the ear and consequent deafness, or diphtheria. As soon as the rash has disappeared the urine should be tested daily for albumen (217).

570. Scarlatina may be confounded with roseola, measles, or small-pox. The eruption of roseola consists of irregular, rose-colored blotches confined to the chest, the throat is less affected, and the accompanying fever is slight. It is known from measles by the absence of the affection of the eyes, nose, and bronchial tubes, and by the different appearance of the rash. Small-pox is sometimes ushered in with an eruption like scarlatina; but the previous pain of the back and the subsequent papular form of the eruption serve to distinguish it.

571. There are three varieties of this disease—*simple*, *anginose*, and *malignant*. In *simple* scarlatina the throat is inflamed but not ulcerated, and the fever is moderate. In the *anginose* variety the throat is ulcerated, the temperature high, the pulse rapid, and the prostration of strength great. In the *malignant* form the eruption is faint or scarcely visible, the pulse is feeble, rapid, and irregular, the tongue brown, the throat is apt to slough, and the glands of the neck are enlarged and suppurate; there is consequently great danger to life.

572. The following table will be found useful in the diagnosis of the above fevers:[1]

Measles.	*Scarlatina.*
Rash appears on the fourth day.	Rash on the second day.
Begins near roots of hairs in spots slightly elevated.	Begins on neck and face.
Color brownish-red.	Color rose-red, or crimson.
Crescentic arrangement with normal skin between redness.	Punctiform, almost uniform.
Slight branny desquamation; accompanying symptoms, coryza and cough, heat of skin moderate.	Copious desquamation; accompanying symptoms, sore throat, strawberry tongue, great heat of skin, rapid pulse.

573. There is an eruptive fever ("Rubeola" or "Rötheln") which seems to be a hybrid between measles and scarlatina. It is preceded by catarrh; the eruption appears on the third or fourth day as minute red spots, that form elevated, irregularly-shaped patches; it is sometimes followed by dropsy.

574. *c.* The patient is attacked with redness, heat, and swelling of some part of the body, attended with the formation of vesicles; the inflammation commences at one part and gradually spreads. There is great pain and stiffness of the parts affected, and the neighboring lymphatic glands are swollen. The accompanying fever is usually high.

The disease is *erysipelas.*

575. The usual site for erysipelas, in medical practice, is the head and face. It is preceded by a certain amount of fever, and generally commences with a slight swelling over the bridge of the nose, or near one of the ears, from

[1] Hillyer's "Handbook of Skin Diseases."

which it spreads until the whole face and scalp are affected. The temperature in the axilla is high, but varies greatly in the course of the disorder. In many cases suppuration of the subcutaneous cellular tissue occurs, and abscesses form as the inflammation subsides. Occasionally the membranes of the brain are attacked, and the symptoms of meningitis present themselves.

576. *d.* On the third or fourth day of illness, an eruption of a papular form has appeared on the face, neck, and wrists; on the second or third day of the appearance of the spots they have become vesicular, and afterwards pustular. The eruption is preceded by severe pain of the back, rigors, vomiting, headache, restlessness, fever, and sometimes delirium.

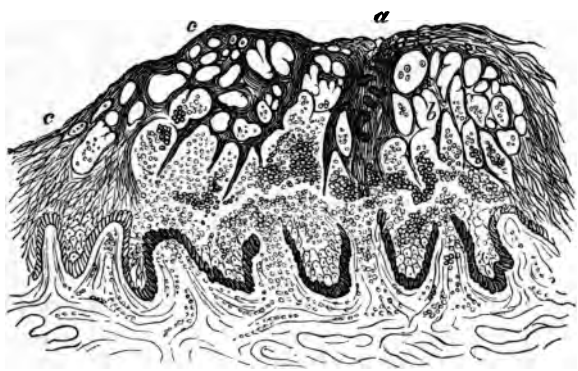
The disease is *small-pox.*

577. The period of incubation is from ten to sixteen days. The fever is usually relieved when the eruption comes out. The spots become pustular about the fifth or sixth day after their appearance; on the eighth day matter begins to ooze from their edges, and a decided increase of fever sets in (*secondary fever*). It is especially marked by a fresh rise of temperature about the eleventh and twelfth days of the fever (the suppurative stage) when the danger to life is the greatest (see Fig. 82). Scabs are formed and fall off on the fourteenth or fifteenth day, leaving pits in their place. The temperature falls when the spots appear, perhaps from 106° to 100°, but it augments again when the secondary fever sets in. Small-pox is termed *discrete* when the spots are few and separate; *confluent* when they run together; the danger being in proportion to the amount of the eruption. When the disease is *modified* by vaccination (*varioloid*), although the primary fever may be very

severe, the spots form scabs and die away about the eighth day without any secondary fever. Small-pox may be complicated, especially during the secondary fever, with pneumonia or bronchitis; or it may be followed by abscesses in various parts of the body, ulceration of the cornea, or pyæmia.

The microscope shows that in the earliest stage there is inflammation of the papillæ of the skin. An exudation takes place from the papillæ into the rete mucosum,

FIG. 81.



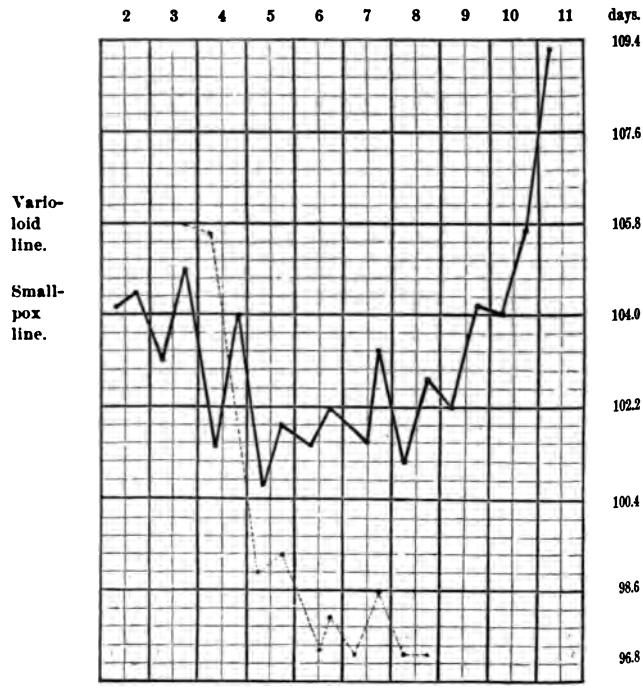
Shows a section through the middle of a pock passing from the granular to the pustular stage. *a*. Umbilicus with duct of sweat-gland. *b*. Cavities in the substance of the rete mucosum filled with lymph. *c*. Small cavities containing pus-cells. (RINDFLEISCH.)

which separates the layers of the rete mucosum from each other (see Fig. 81). When suppuration occurs, if the rete mucosum is alone destroyed no scar is left. But, when the papillæ become so infiltrated by newly-formed cells that their bloodvessels are compressed, sloughing takes place, the dead parts are thrown off, and, when the part heals, a scar is the consequence.

578. Small-pox is chiefly distinguished from other

eruptive fevers in the primary stage by the severe pain of the back and the vomiting that accompany it. In the early period of the eruption the fact that the spots feel

FIG. 82.



Shows the course of the temperatures in a case of small-pox which terminated fatally in the suppurating stage, and in a case of modified small-pox (*varioloid*). (WUNDERLICH.)

to the finger as if small shots were imbedded in the skin, is very valuable in distinguishing this complaint from measles and scarlatina. In the worst forms of small-pox the eruption is sometimes preceded by a livid redness of the skin, more or less diffused; delirium and typhoid

symptoms, or hemorrhage from the mucous membranes, may speedily follow.

579. *e.* On the second day of a mild fever there has appeared an eruption, which is at first papular, but in a few hours becomes vesicular. The spots have no inflammatory ring around them in the first stage.

The disease is *chicken-pox.*

580. This disease is peculiar to childhood and early adult age. The eruption consists of a series of crops that succeed each other for four or six days, at intervals of twenty-four hours. Each spot forms a scab, about the fourth day of the fever, which falls off and seldom leaves any pit. It is distinguished from small-pox by the mildness of the premonitory symptoms, the distinctly vesicular character of the spots, the absence of hardness to the finger, and by the shorter course of the complaint.

Section II.

NO ERUPTION HAS APPEARED IN THE EARLY STAGE OF THE FEVER, AND, IF PRESENT, IT IS USUALLY SMALL IN AMOUNT; THE FEBRILE SYMPTOMS HAVE BEEN CONTINUOUS FROM THEIR COMMENCEMENT.

581. Under this head you may have,—typhus, typhoid, relapsing fever, cerebro-spinal fever, influenza, febricula, and rheumatic fever.

582. *a.* The patient lies on his back in a state of half-consciousness, or low muttering delirium; the eye is injected, the cheeks are uniformly flushed and of a dusky color, the lips are covered with sordes, the tongue dry

and brown. There are thirst and absence of appetite, but the bowels are not usually purged. The pulse is rapid and feeble, skin hot, respiration increased in frequency. An eruption generally appears on the body and limbs from the fifth to the seventh day, the spots of which are dark-colored and persistent; they are at first slightly elevated, but after a few days become flat, and do not disappear, although they are made paler by pressure.

The disease is *typhus*.

583. The attack of typhus is generally sudden, and begins with chilliness, lassitude, noise of the ears, giddiness, pains of the head and limbs, quick pulse, and hot skin. In other cases it is preceded for a few days by feebleness, headache, and want of appetite. The loss of muscular power is early and marked. The tongue is at first large and pale, afterwards covered with a yellow brown fur. As the disease advances, the stupor increases, the pupils are contracted, the muscles twitch, the hands tremble or catch at the bedclothes, the pulse is so rapid and feeble as scarcely to be felt, and the dulness in the region of the spleen is much increased in extent. The urine and fæces are often passed involuntarily, or the bladder becomes distended from loss of its power of contraction, and bedsores form on the hips and nates. In severe cases the impulse and the first sound of the heart are very feeble, or may be undistinguishable, the second sound being clear and distinct. Typhus is not unfrequently complicated with pneumonia, sometimes with convulsions. The rash is often absent in children and in young persons.

584. There is usually a sudden rise of temperature at the onset, and there is less difference between the morn-

ing and evening temperature than in typhoid fever, although it is highest in the evening. In mild cases the temperature attained on the third or fourth day remains without increase until the end of the first week, and after the seventh or eighth day there is a decided remission. In severe cases the temperature increases after the fourth day, and there is no remission on the seventh day. The fever increases in the beginning of the second week; in mild cases the increase lasts only a few days, but in severe ones, it continues until the end of the second week. The critical stage is at the latter end of the second week, or in severe cases at the beginning of the third week. The turning-point is most generally about the fourteenth day, and the decline of the fever is, in cases of recovery, often very sudden, forming what is termed a crisis (see Fig. 83). If the temperature does not exceed 103.5° before the fourth day, the case will probably be a mild one.

585. You may confound typhus with typhoid fever, pneumonia, and meningitis (506). You can only distinguish typhus when complicated by pneumonia from pneumonia attended with typhoid symptoms, by ascertaining which disease was first developed, and whether or not the characteristic eruption is present. In many cases delirium is a prominent symptom: it seldom sets in until the end of the first week; it is low and muttering, and accompanied by great restlessness. This symptom is apt to make the diagnosis between typhus and meningitis difficult, but the former differs from the latter in the appearance of the tongue, the presence of an eruption, and the feebleness of the pulse; meningitis is accompanied by vomiting, and the headache is more severe and con-

stant than in typhus. It must be remembered that meningitis may occur as a complication of typhus.

586. *b.* The patient suffers from great weakness, his mind is dull or wandering, the cheeks have a bright circumscribed flush, the tongue is coated, red, fissured, or dry. There are headache, thirst, loss of appetite, and purging of the bowels, the stools being of a yellow color. The pulse is quick and feeble, the skin hot, and there is swelling of the abdomen, with tenderness and gurgling on pressure over the right iliac region, and increased dulness in the region of the spleen. An eruption appears, about, or after, the seventh day, of a few rose-colored lenticular spots, which disappear for a moment on pressure. The eruption is chiefly confined to the chest and abdomen, and each spot disappears in a few days, to be succeeded by others near it.

The disease is *enteric* or *typhoid fever.*

587. This disease is usually confined to persons below forty-five years of age, whilst typhus attacks individuals at any period of life. The approach of typhoid fever is usually insidious, and the first symptoms are those of dyspepsia, sleeplessness, languor, dull pain of the head, often succeeded by slight delirium at nights, loss of appetite, and diarrhœa.

588. The temperature rises very gradually during the first week, that in the evening is often 2° higher than in the morning, whilst the next morning is 1° less than the preceding evening. At the end of the first week there is no increase of evening temperature, but that of the morning is still less than in the evening. In the second week there is only a slight morning remission. In the beginning of the third week there is often an increase of temperature, and, if improvement takes place, the differ-

ence between the morning and evening is very striking (see Fig. 83). In case of recovery the fall in temperature is gradual, not sudden as in typhus. Mild cases are generally ended in twenty-one days, but severe ones may last four or five, or even eight or ten weeks. A *permanent* temperature of 104°, or an elevation of the morning over the evening temperature, is an unfavorable sign.

589. A fatal issue may occur whilst the patient seems to be recovering, from perforation of the intestine or hemorrhage from the bowels. Recovery is generally slow, and the mind often remains feeble for some weeks. Typhoid fever is often complicated with pneumonia, or it may be followed by phthisis. In fatal cases disease is always present in the lower part of the ileum. The mucous membrane is inflamed, and the solitary glands and Peyer's patches are either enlarged, prominent, and surrounded by inflammation, or they are in a state of ulceration; the mesenteric glands are also softened and enlarged. The perforation of the intestine, which cuts off many cases of typhoid fever, is the result of these ulcerations.

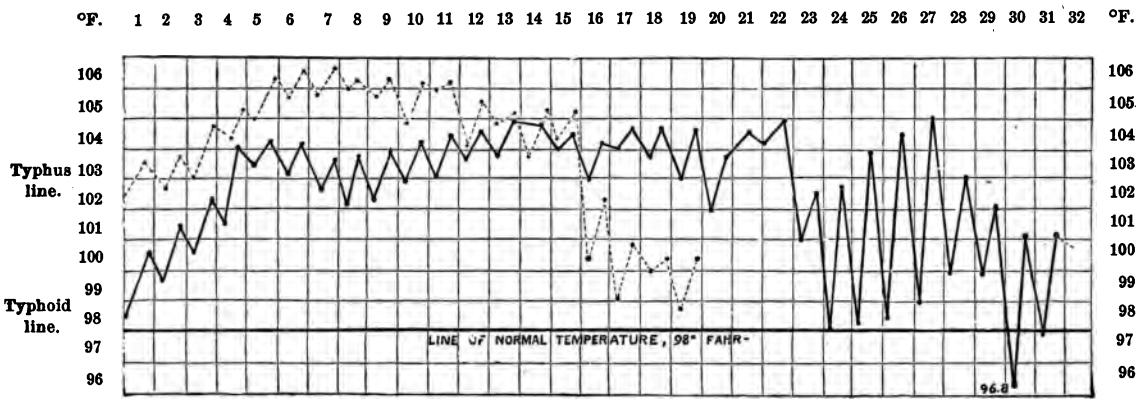
Microscopically, in the earliest stage the whole of the mucous membrane is in a state of catarrhal inflammation, the lymphatic follicles are enlarged by an increase in the number of their cells, whilst the bloodvessels around them are greatly congested. The surrounding connective tissue is next infiltrated with cells, and unites with the enlarged follicles to form a soft medullary mass. The follicles may return to their normal state, either by the degeneration and subsequent absorption of their cells, or they may burst and discharge their contents. In other cases, sloughing of the affected structures occurs, the

dead parts are thrown off, and the ulcers before described are left. The "typhus" cells are said by some to differ from the ordinary lymph-corpuscles, in containing a much larger mass of protoplasmic material.

590. You will most easily confound enteric fever with meningitis, tubercular peritonitis, acute phthisis, and typhus. You distinguish it from meningitis by the absence, or less urgency, of the vomiting, the less severe pain of the head, the feebleness of the pulse, the dryness of the tongue, and the diarrhœa present in enteric fever. Although, in both typhoid fever and tubercular peritonitis you may have hectic flush, pinched features, pain of the abdomen, and diarrhœa, yet in peritonitis the tongue is usually clean, and there is no eruption. Acute phthisis is distinguished from typhoid fever by the cough and difficulty of breathing, which appear earlier, and are more intense in the former, by the lower temperature, and the presence of the stethoscopic signs of tubercle, when these exist; also by the absence of the typhoid eruption and enlargement of the spleen. Typhus differs from typhoid fever in attacking persons above forty-five years of age. The attack is more sudden, the duration shorter, delirium or stupor appears sooner, the face is dusky and generally flushed, the bowels are usually constipated, and the rash is darker, more general, and not, after the first day or two, obliterated by pressure, nor does it appear in successive crops. Typhoid fever in children is often described as *infantile remittent fever*.

591. *c*. The patient has been suddenly attacked with rigors, headache, and pain of the back or limbs; the tongue is white, there are thirst, often vomiting, and confined bowels; the pulse is very rapid, the skin hot and dry, with occasional sweatings; there is no eruption, but

FIG. 83.



Typical ranges of temperature in cases of typhus and typhoid fever. The dotted line indicates the typhus range; the continuous dark line that of typhoid; the two dots under each day indicate the morning and evening temperatures. (WUNDERLICH and TRAUBE.)—(*From* AITKEN'S *Practice of Medicine.*)

jaundice is often present. The symptoms disappear, after a violent sweating, from the fifth to the eighth day, but reappear, as at first, about the fourteenth day of the illness. The relapse usually terminates in from three to eight days, but may be succeeded by others.

The disease is *relapsing fever.*

592. This disease seldom appears except as an epidemic, and is chiefly seen amongst the poor and ill-fed part of the population. It may be impossible to diagnose it from other fevers previous to the crisis. Convalescence is generally very slow, and it is apt to be complicated with severe ophthalmic or rheumatic affections. When jaundice is present the stools are of their natural color and may even be abnormally dark. The temperature sometimes falls 10°, or even more, during the crisis.

593. *d.* After a short interval, in which the patient has suffered from severe headache, giddiness, and vomiting, he is attacked with excessive pain of the neck and back, increased by pressure and motion. The head is drawn backwards, the jaws are often closed, swallowing is difficult, the back is arched and painful, tetanic spasms affect the muscles. The patient becomes delirious, the pupils are contracted, the pulse and respiration rapid.

The disease is *cerebro-spinal fever.*

594. The invasion of this complaint is almost always sudden, and it usually occurs as an epidemic. The mortality is great, and it chiefly attacks the young and middle-aged, seldom persons advanced in life. An eruption of herpes, in other epidemics of purpura, occurs on the face and limbs. The temperature seldom rises above 103°. In fatal cases there is an exudation of lymph on the membranes of the brain and spinal cord, the sub-

stance of these parts being usually abnormally soft and vascular.

595. Besides the above forms of fever you meet with what is termed *simple continued fever*. In this there are headache, a frequent full pulse, white and coated tongue, thirst, loss of appetite, hot dry skin, pains of the back and limbs, and inability for severe mental or bodily exertion; but it is unaccompanied by any eruption, and usually terminates by a severe sweating. Before determining a case to be one of simple continued fever, be careful to examine the condition of every important organ, lest the fever be the result of some hidden inflammation.

596. *e.* The patient is suddenly attacked with great prostration of strength and aching of the limbs, along with intense headache, discharge from the eyes and nose, sneezing, sore throat, dyspnœa, cough, expectoration, and fever.

The disease is *influenza*.

597. Often severe frontal pain is first complained of. The catarrhal symptoms are at their height on the second or third day, and decline from the fifth to the seventh day. Cough and expectoration frequently remain for some time after the fever. Influenza is sometimes complicated with capillary bronchitis or pneumonia; it generally prevails as an epidemic. Fatal cases are chiefly confined to children and aged persons, or to those already affected with some serious disease of the heart or lungs. The average duration of the disease is from three to five days in mild cases, and from seven to ten in those more severely affected.

Section III.

THE PATIENT IS SUBJECT TO PERIODICAL ATTACKS OF FEVER.

Under this head you only meet with ague in this country.

598. *a.* The patient is periodically attacked with shiverings attended with quick pulse, uneasiness, oppression of breathing, or sense of fatigue; these are succeeded, after a period varying from half an hour to two hours, by great heat of skin, restlessness, thirst, rapid full pulse, and scanty secretion of urine; afterwards a profuse perspiration breaks out with relief of all the symptoms.

The disease is *ague.*

599. The mean duration of the first stage is from three to eight hours. Ague occurs under different forms. If the attack occurs daily it is termed *quotidian;* if every forty-eight hours *tertian;* if every seventy-two hours *quartan.* It is called *double tertian* when the patient is attacked daily, but the attacks of alternate days alone correspond in severity and time. Ague is sometimes complicated with, and still more frequently followed by, enlargement of the liver and spleen. The rise in temperature is found to precede or commence with the cold stage; when the sweating has fairly set in the heat begins rapidly to fall. The temperature may rise to 106°, or even in some cases to 108°.

CHAPTER XII.

RHEUMATISM AND GOUT.

600. THESE diseases are characterized by inflammation affecting the muscular, fibrous, or serous structures of the body; the inflammation seldom goes on to suppuration, and is apt frequently to change its seat. They may give rise to affections of many, if not of all the internal organs. They may attack the patient suddenly, or their course may be slow and lingering.

601. In ACUTE RHEUMATISM (RHEUMATIC FEVER) the joints are swollen, hot, red, painful, and excessively tender. The larger articulations are chiefly affected, different joints are either attacked together, or in succession, and the pain is so greatly increased by the slightest movement that the patient lies in a helpless condition. The skin is covered with a profuse, acid perspiration, having a sour smell, the urine is scanty, high-colored, and loaded with lithates, the bowels confined, the pulse quick and bounding (90 to 110); there is constant thirst, and the tongue is white. The blood contains an abnormal amount of fibrin; in the urine there is an increase of urea and lithic acid, whilst the chlorides are deficient in quantity, or are altogether absent. As pericarditis or endocarditis occurs in a large proportion of the cases, and as these diseases are often unattended by pain, or other symptoms tending to direct attention to the heart, you should examine the chest daily with the stethoscope. In other cases the patient is attacked with pleurisy, pneumonia, or delirium. The affection of the joints is

generally preceded for twenty-four or forty-eight hours by chilliness, languor, heat of skin, and other symptoms of fever; in some cases the heart is affected at this period. Acute rheumatism is believed by many pathologists to arise from the presence of lactic acid in the blood. It is often hereditary, usually follows exposure to wet and cold, and is occasionally a sequence of scarlatina.

602. SUBACUTE RHEUMATISM.—The pain and swelling of the joints are less, the fever is not so intense, and the liability to affections of the heart is not so great as in the acute form. A variety of it is often met with in persons suffering from gonorrhœa, and is termed *gonorrhœal rheumatism.*

603. CHRONIC RHEUMATISM may remain as the result of rheumatic fever, or it may attack those who have been previously healthy. There is no fever, but the parts affected are painful and tender, and the suffering is increased by motion. When it occurs in the joints, adhesions are apt to take place, so that the motions of the limb become restrained, and you can often feel a grating on moving the joint, when the hand is placed over it. Chronic rheumatism is most generally met with in persons advanced in life.

604. Rheumatism is often named according to the structure principally affected. Thus lumbago, or rheumatism of the muscles of the loins, is termed *muscular rheumatism;* when the periosteum is inflamed, it is termed *periosteal rheumatism.* In the diagnosis of local rheumatism you must first exclude all other causes likely to produce the pain of which the patient complains; for instance, pain of the loins may arise from a disease of the spine or kidneys, from aneurism of the aorta, affections of the testes in the male, or of the

uterus or ovaries in the female. If, then, you meet with a case of long-standing pain in this region, you should first ascertain that none of the above complaints are present before determining that rheumatism is the cause of the suffering.

605. GOUT chiefly attacks the smaller joints, and may present itself as an acute or chronic affection. In the acute form the fever is less, but the pain is as severe as in rheumatism. Usually only one or two articulations are affected at a time, and the inflammation is succeeded by œdema, and desquamation of the skin takes place. "Chalkstones" are often formed near the joints, and in the cartilages of the ears. Microscopically, when the cartilages are affected the cartilage-cells are loaded with the deposit of urate of lime. In the bones and membranous parts of the joints the deposit is generally distributed through the textures of these parts. Gouty persons are always subject to indigestion, and an attack in the joints is usually preceded for a few days by listlessness, languor, want of appetite, acidity after meals, flatulence, and constipation. The seizure generally occurs during the night, and, in first cases, is usually limited to the ball of the great toe. Gout is hereditary; it never attacks children, seldom occurs below thirty years of age, is most common in persons of a full habit, and in those who live luxuriously.

606. Dr. Garrod has proposed the following method of ascertaining the presence in the blood of gouty patients of uric acid, which is believed to be the cause of this complaint: "Take from one to two fluid drachms of the serum of the blood (or of the fluid obtained from a blister) and put it into a flattened glass dish or capsule; those I prefer are about three inches in diameter,

and one-third of an inch in depth, which can be readily procured at any glass-house; to this add ordinary strong acetic acid in the proportion of six minims to each fluid drachm of serum, which usually causes the evolution of a few bubbles of gas. When the fluids are well mixed, introduce a very fine thread, consisting of from one to three ultimate fibres, about an inch in length, from a piece of unwashed huckaback, or other linen fabric, which should be depressed by means of a small rod, as a probe or point of a pencil; the glass should then be put aside in a moderately warm place until the serum is quite set, and almost dry; the mantelpiece, in a room of the ordinary temperature, or a bookcase, answers very well, the time varying from twenty-four to forty-eight hours, depending on the warmth and dryness of the atmosphere. Should uric acid be present in the serum above a certain small amount, it will crystallize, and, during its crystallization will be attracted to the thread, and assume forms not unlike that presented by sugar-candy on a string. To observe this, the glass containing the dried serum should be placed under a linear magnifying power of about fifty or sixty, procured with an inch object-glass and low eye-piece, or a single lens of one-sixth of an inch focus answers perfectly."

607. CHRONIC OSTEOARTHRITIS, or CHRONIC RHEUMATIC ARTHRITIS, is a slow, lingering, painful disease, that affects both the larger and smaller articulations. It first causes effusion into the joint, but afterwards the cartilages are diseased, and the limbs become stiff, often useless and distorted. It chiefly attacks persons of delicate constitution, and is most common amongst females at the commencement and termination of menstruation.

CHAPTER XIII.

DISEASES OF THE SKIN.

608. You will probably find more difficulty in the diagnosis of the diseases of the skin than of any other structure in the body. This arises chiefly from the number of different classifications that have been proposed, and the variety of names that have been bestowed upon the same complaint. In the present chapter the system of Willan and Bateman has been mainly followed, as it is that which is chiefly used in this country, and is also most easily remembered. You must bear in mind that an eruption may alter its appearance during its progress, and therefore you must be careful in any difficult case to inquire as to its condition in its early stages. If it is general, examine it in different parts of the body, for its character may be altered by the friction of the clothing, or other circumstances. In many instances the diagnosis requires you to ascertain if the eruption is contagious, or has been produced by a local irritant. It is a good plan to make yourself familiar with the various forms of skin diseases by means of colored plates or wax models, before you begin your observations on the living subject, so that you may more readily seize on their distinctive characters when they come before you.

609. When inflammation attacks the skin, a greater variety of morbid appearances is produced than when it affects the mucous membranes or other parts of the

body. These appearances serve as a means of classification, and it is therefore necessary that they should be carefully studied. The following definitions are taken from Willan and Bateman:

610. "*Papula* (*Pimple*): a very small and acuminated elevation of the cuticle with an inflamed base, very seldom containing a fluid, or suppurating, and commonly terminating in scurf. *Vesicula* (*Vesicle*): a small orbicular elevation of the cuticle, containing lymph, which is sometimes clear and colorless, but often opaque, and whitish or pearl-colored. It is succeeded either by scurf, or by a laminated scab. *Pustula* (*Pustule*): an elevation of the cuticle, with an inflamed base, containing pus. *Tuberculum* (*Tubercle*): a small, hard, superficial tumor, circumscribed and permanent, or suppurating partially. *Bulla* (*Bleb*): a large portion of the cuticle detached from the skin by the interposition of a transparent watery fluid." In all the above, small portions of the skin are raised above the surface, and you will observe that the papula differs from the tubercle, and the vesicle from the bleb only in size. "*Exanthemata* (*Rashes*): superficial red patches, variously figured, and diffused irregularly over the body, leaving interstices of a natural color, and terminating in cuticular exfoliations. *Squama* (*Scale*): a lamina of morbid cuticle, hard, thickened, whitish, and opaque. *Macula* (*Spot*): a permanent discoloration of some portion of the skin, often with a change of its texture."

611. Besides the above alterations in the appearance of the skin, each separate structure of which it is composed is liable to disease. The papillæ of the skin are greatly increased in size in warts and corns, the appearance of which it is unnecessary to describe. *Warts* are

enlargements of the papillæ, each one of which contains a loop of bloodvessels and also nerves. *Corns* are of the same nature as warts, excepting that the epidermis covering them is greatly thickened by pressure.

612. The secretion is not unfrequently retained in the sebaceous follicles, the surface of which becomes covered with dirt, and forms a black spot on the skin. The secretion can be readily squeezed out, and looks like a little grub. If the little tumor thus formed is uninflamed it is termed a *comedo;* if inflamed it is named *acne.* When the secretion is not confined to the excretory ducts, but distends the sebaceous glands themselves, a little tumor is produced called *Molluscum.* A minute animalcule, varying in length from $\frac{1}{130}$th to $\frac{1}{80}$th of an inch in length, is often met with in the sebaceous follicles (*acarus folliculorum*). It lies lengthways in the follicle, with the head downwards, but it does not seem to give rise to irritation, as it is often met with in the skin of persons who are not liable to acne.

613. Authors describe three forms of vegetable parasites which present themselves in diseases of the skin; two of these are confined to the hair, the third is found on the surface of the skin. The best method of displaying these minute bodies is to extract a few hairs from the diseased part, or, in the case of *pityriasis versicolor,* to scrape off a little of the epidermis. Place the object thus obtained on a clean slide, add a drop or two of liquor potassæ, cover it with a piece of thin glass, and examine it with a microscope having a quarter of an inch object-glass.

614. When the crust of *favus* is thus treated, a number of vegetable cells termed "spores," intermixed with a large amount of granular matter, are brought into

view. The spores are oval or round, about $\frac{1}{3000}$th of an inch in diameter, are slightly constricted about the centre, and are mixed with numerous branched tubes, some of which are empty, some filled with granular matter, and which vary in diameter from $\frac{1}{4000}$th to $\frac{1}{15000}$th part of an inch in diameter. This parasite is named *Achorion Schœnleinii*, and may be seen in the substance of the hair itself.

615. The parasite in *Tinea tonsurans*, *Tinea circinata*, and, according to some authors, in *Sycosis*, presents the appearance of round or oval spores, about $\frac{1}{7000}$th of an inch in diameter, mostly isolated, but also united in the

FIG. 84.



Hairs from a case of Tinea tonsurans loaded with spores. (McCALL ANDERSON.)

form of chains. It is termed the *Tricophyton*, and differs from the *Achorion* chiefly in the smaller number of its tubes and the larger quantity of its spores (see Fig. 84).

616. The *Microsporon furfur* is found on the patches of skin affected with *Pityriasis versicolor*. It presents a number of spores of considerable size collected into clusters, like bunches of grapes, intermixed with numerous branching tubes (see Fig. 85).

FIG. 85.



Spores and tubes of the *Microsporon furfur*, from a case of Pityriasis versicolor. (McCALL ANDERSON.)

617. *Pediculi* (lice) are common causes of irritation of the skin. Three varieties are mentioned, which differ in appearance, viz., Pediculus capitis, Pediculus pubis, and Pediculus corporis. The latter of these is a frequent cause of *prurigo* in old persons. The insects and their ova should be carefully searched for in the folds of the clothes worn next the skin (see Fig. 86). Pediculus capitis is often associated with eruptions on the head in children.

618. The *Acarus scabiei* is the cause of scabies or itch. In this disorder furrows (*cuniculi*) can be often

detected, which are formed by the insects. "Before endeavoring to detect the cuniculi it is often useful to make the patient wash the part, especially if the skin is dirty. A minute whitish elevation can then be seen at the extremity of each, which is, in effect, the insect itself covered by a thin layer of epidermis. It can be very readily removed by gently raising with a penknife the epidermic covering, and then inserting the point in the direction of the acarus,"[1] which can be then examined by the microscope. In other cases you may obtain evidence of the presence of acari by a plan recommended by Dr. Hilton Fagge.

FIG. 86.



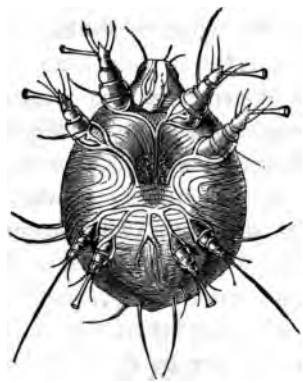
Pediculus corporis (female). (McCALL ANDERSON.)

A piece of the scab must be boiled in a solution of caustic soda (℥ss. to ℥j of water) until it is dissolved. Pour the fluid into a conical glass, suck up the deposit with a dipping-tube, and place it on a clean slide for microscopic examination. The full-grown acarus has eight legs situated on a round body, and has a project-

[1] Anderson, "On Skin Diseases."

ing head (see Fig. 87). The female is larger than the male, and varies from $\frac{1}{7}$th to $\frac{1}{4}$th of a line in length.

FIG. 87.



Male acarus. (MCCALL ANDERSON.)

The eggs, which are usually found in the furrows, are about $\frac{1}{2\,5}$th of a line broad, and $\frac{1}{1\,1}$th of a line long.

619. If the scalp or other part thickly covered with hair be the seat of the disease, pass on to (694). If the skin presents simply a change of color, unaccompanied by pain, itching, heat, or swelling, pass on to (687). If the eruption is accompanied by signs of inflammation, pain, or itching, begin at (620). Increased production of epidermis and thickening of the skin are here assumed to arise from inflammation.

Section I.

THE ERUPTION IS ACCOMPANIED BY INFLAMMATION, PAIN, OR ITCHING.

620. First observe if there be any hard, solid projections of the skin (tubercles), or ascertain if these were present at the commencement of the complaint, and if so, pass on to (681). If such is not the case, remark if the eruption is dry or moist. If it has existed for some time you may have to determine this point by the previous history of the case, and by observing if the part present scabs or scales on its surface. Remember that scabs result from the drying up of serous, purulent, or bloody secretions, whilst scales are produced by an increased formation of dry epidermis. If the complaint is of a dry character, begin at (621); if it is, or has been attended with a fluid secretion, pass on to (652).

A. The eruption is of a dry character.

621. Under this head you may have the Papular, Scaly, or Exanthematous forms of disease; each of these is again subdivided into *three* orders. Observe if the skin is raised into pimples, and if so, begin at (622). If this is not the case, see if there is an increased formation of epidermis (631); otherwise pass on to (641). Remember that papular diseases are often followed by a scurfy condition; you distinguish them from the squamous affections by the total absence in the latter of any pimples.

a. The eruption is papular.

622. You may have three diseases under this head—Lichen, Prurigo, and Scabies (664).

623. *a. a.* The eruption consists of a number of minute

pimples, generally of a red color, sometimes separate, at other times grouped together, and attended by itching of a tingling character.

The disease is *lichen.*

624. The complaint sometimes commences with slight fever, and lasts only for a week or ten days, but usually it runs a more chronic course. It ordinarily affects the parts where the skin is thickest, as the back of the forearm and hands, and the outside of the thigh and leg. When lichen occurs in children it is named *Strophulus*, which is often dependent on teething or derangements of the digestion.

625. The chief varieties of lichen are—

L. circumscriptus.—Clusters of pimples of an irregularly circular form.

L. agrius.—The irritation of the skin being severe.

626. Lichen is distinguished from scabies by the latter presenting vesicles as well as papules, by the eruption being situated where the skin is thin, as between the fingers, and by the discovery of the acari or their eggs. From eczema by the edges of the patches of lichen showing papules, not vesicles, by the skin being thicker, rough and harsh, and not having the yellow crusts of the former.

627. *b. b.* The eruption presents scattered, and rather flattened papulæ, scarcely differing in color from the surrounding skin, but usually covered with a small black scab. The skin is generally thickened, flabby, and dirty-looking. The itching is intense, and is increased by warmth.

The disease is *prurigo.*

628. At the commencement of the complaint few papules may be present, and itching is the prominent

symptom. The black scabs on the pimples are produced by scratching. The parts chiefly liable to prurigo are the outer parts of the limbs, the neck, chest, back, anus, and genital organs.

629. The chief varieties of the disease are—

P. mitis.—In which the itching is tolerably slight.

P. formicans.—The itching severe, and accompanied by stinging and pricking.

P. senilis.—When it occurs in old persons.

Prurigo is also named according to the locality affected; thus, *P. podicis*, when the neighborhood of the anus is attacked; *P. pudendi* and *P. scroti*, when the female or male genital organs are the seats of the disease.

630. In a large number of instances, especially in old persons, the prurigo is produced by the irritation set up by lice. This is especially the case when the eruption is confined to the neck, back, and shoulders. In all doubtful cases examine the clothes for the insect or its eggs (Fig. 86).

b. The eruption is of a scaly character.

631. Under this head you have also three forms of disease, viz., psoriasis, ichthyosis, and pityriasis. Ascertain, by gently pinching up a fold of the affected part, if the cutis is thickened; if so, the case is one either of psoriasis or ichthyosis; if the complaint is entirely superficial, it is pityriasis.

632. *a. a.* The eruption consists of elevated patches of dry white epidermis. When the scales are removed, the cutis below them is found to be slightly raised, somewhat thickened, and of a red color. Chaps often occur when the complaint affects the hands, feet, or other parts, liable to constant motion. The itching is slight.

The disease is *psoriasis.*

633. The term *lepra* used to be applied to those cases in which the eruption assumed a circular form, but it is now seldom employed. Psoriasis commences in the shape of small elevations of the skin capped by a thick layer of epidermic scales; these gradually extend, mostly in a circular shape. The disease usually attacks persons in good health, and is often hereditary.

The chief varieties are named from the shape of the patches, or according to the part affected; thus—

P. guttata—The spots like drops of mortar.

P. diffusa—When a large portion of skin is involved.

P. capitis—When the scalp is attacked.

P. palmaris—When it affects the palm of the hand.

634. Psoriasis is most generally found just below the elbows and knees; when the palm of the hand or the sole of the foot is alone affected, the disease is almost always of a syphilitic character. When the scalp is the seat of the disorder, you may confound it with eczema; but in the latter the hairs are glued together by the dried secretion, which is not the case in psoriasis.

635. *b. b.* The *whole* skin of the part affected is covered with a dry, hard, thick, almost horny epidermis, which is irregularly elevated, being either raised into prominences, or showing the natural divisions of the skin. If the cuticle is removed, there is no redness of the skin beneath. The complaint is not attended by pain or itching.

The disease is *ichthyosis.*

636. The name has been derived from the resemblance of the skin to the skin of a fish. The disease seems to consist in an increased thickness and altered condition of the epidermis, and is sometimes accompa-

nied by hypertrophy of the papillæ of the cutis. It is often hereditary, and, in some cases, congenital. When general it usually avoids the palms of the hands, the soles of the feet, and the axilla; when local it chiefly affects the legs and forearms near the elbows.

637. It is distinguished from psoriasis by its not occurring in patches with healthy skin intervening between them, by the absence of decided exfoliation of the epidermis and redness of the cutis.

638. *c. c.* The part affected is covered by an increased formation of fine scales of epidermis, which are being constantly rubbed off in the shape of a powder. The cutis is not thickened. It is generally attended with a considerable amount of itching.

The disease is *pityriasis.*

639. Some authors look upon this disease as only a variety of erythema. It has received its name from the bran-like character of the scales.

The varieties are named from the part of the body affected; thus we have *P. capitis*, when the head is the seat of the disorder. *Pityriasis versicolor* is a disease depending upon the presence of a vegetable growth (the microsporon furfur, Fig. 85). It presents itself as an eruption of irregularly formed patches of a yellow-brown color, from which scales can be easily removed by friction, which under the microscope display the vegetable growth. It is chiefly met with on the trunk of the body, and is seldom attended with much itching.

640. Pityriasis on the scalp may form patches, which in children may be mistaken for "ringworm" (699); but the circular character, the elevation of the edges, and the microscopic characters of the hairs in the latter complaint, will suffice to distinguish it.

c. The disease is of an exanthematous character.

641. The rashes attended with a considerable amount of fever have been already described (563). You meet with three forms of rash in which fever is absent, or of only moderate amount,—Roseola, erythema, and urticaria. First remark if there are prominent smooth patches, redder or whiter than the surrounding skin (wheals), and attended with severe itching and tingling; if so, pass on to (650). If this is not the case, begin at (642).

642. *a. a.* The skin is covered with irregularly-shaped patches of a more or less red-rose color, slightly, if at all elevated. The throat is sometimes similarly affected; there is often slight fever, and the rash is attended with itching or tingling.

The disease is *roseola.*

643. The rash may affect the whole body, as in measles and scarlatina, or it may be limited to some particular part. It often appears in the course of other diseases, but does not affect their course or issue.

644. The varieties are classed as idiopathic or symptomatic:

Idiopathic.	*Symptomatic.*
R. Infantilis, affecting children.	*R. Variolosa.*
R. Æstiva: affecting adults, chiefly in summer.	*R. Vaccina.*
R. Autumnalis: affecting adults in autumn.	*R. Rheumatica.*
R. Annulata: the eruption in shape of rings.	*R. Arthritica.*
	R. Choleraica.

645. Roseola is most likely to be confounded with measles and scarlatina. It is distinguished from the former by the small amount of fever and the absence of catarrhal symptoms, by the uniformity of the redness,

and the deeper color of the patches; from scarlatina, by the smaller amount of inflammation of the throat, and the slight degree of fever with which it is accompanied.

646. *b. b.* Patches of the skin present a red color that disappears under pressure. The parts are sometimes slightly elevated, and the complaint is often attended with heat or itching.

The disease is *erythema.*

647. Erythema differs from roseola in its being limited to a portion of the skin, and in the absence of any fever.

648. The complaint has been described under different forms—

E. læve.—Eruption on the legs of dropsical persons.

E. fugax.—Patches suddenly appearing and disappearing.

E. intertrigo.—Eruption produced by the friction of adjacent parts of body.

E. nodosum.—Elevated patches, chiefly over the shin-bones and arms, never on the body.

649. Erythema is distinguished from erysipelas by its having no tendency to spread, by the slight amount of swelling, heat, and pain, the absence of fever and vesication.

650. *c. c.* The patient is affected with round or oval, elongated, prominent patches of the skin, that present the appearance of being produced by nettles. They appear and disappear suddenly, can be often excited by scratching, are not followed by desquamation, and are accompanied by intense heat and itching.

The disease is *urticaria.*

651. It often arises from indigestion, and in some persons certain articles of diet quickly give rise to it.

B. The eruption is of a moist character.

652. The vesicular and pustular forms of inflammation of the skin are included under this head. To distinguish between these, remember that the contents of the latter are *from the first* purulent, for the fluid of vesicles, though at first clear, often becomes turbid as the disease progresses. If the eruption is vesicular, begin at (653); if pustular, pass on to (669).

a. The eruption commences with vesicles.

653. Under this head we have five orders—Eczema, Herpes, Sudamina, Scabies, and Pemphigus. Rupia, which often contains a clear fluid at first, and is therefore classed by many amongst vesicular diseases, is by others referred to the pustular group. Chicken-pox also presents a vesicular eruption, but is described amongst Fevers (578). If the vesicles exceed a four-penny piece in size they are named bullæ; if the eruption is formed of such, pass on to (667).

654. *a. a.* The eruption consists of irregularly-shaped patches of minute vesicles, usually not larger than a pin's head, which, on breaking, discharge a fluid that stiffens linen and dries up into thin, yellow crusts. It is attended with pain, smarting, or itching.

The disease is *eczema.*

655. No vesicles may be apparent, the disease is then recognized by the skin feeling thick when pinched up with the fingers, by the *starchy* nature of the discharge, the formation of thin yellow crusts, and the attendant itching. It is one of the most common eruptions, is often hereditary, and is sometimes associated with rheumatism or bronchitis.

656. The chief varieties are—

E. simplex.—When the itching and inflammation are moderate.

E. rubrum.—A more inflammatory form of the disease; often on legs affected with varicose veins.

E. impetiginodes.—A combination of eczema and impetigo.

It is likewise named according to the part affected—*Eczema capitis.*

657. Chronic eczema occasionally simulates psoriasis, but in such cases you observe that the scales are formed by the drying up of secretion, not as in the latter, by an increased formation of dry epidermis. When it affects the scalp, it may be mistaken for pityriasis, but in the latter the surface has been dry from the commencement and the hairs are not glued together.

658. *b. b.* The eruption is formed of a number of large vesicles, grouped together on an inflamed base; they go through successive stages of maturation and scabbing, and are not reproduced. It is attended with heat and smarting, and sometimes with severe pains of a neuralgic character.

The disease is *herpes.*

659. Herpes usually commences as a red patch, on which vesicles shortly form. In some cases the eruption is preceded, in others it is followed, by severe neuralgic pains, and it is usually seated over the course of a sensitive nerve, such as the frontal or one of the dorsal nerves.

660. The varieties are divided into a phlyctenoid and a circinate group. In the former the eruption presents no regularity of shape; in the latter, it is more or less circular. *Herpes circinatus* is a parasitic disease, and will be described in the affections of the hair. In *herpes*

zoster, or "shingles," the patches of spots are arranged in the form of a band around half of the body, or down one limb. *Herpes preputialis* has been often mistaken for syphilis.

661. Herpes differs from eczema in the localized nature of the patch, in the absence of the oozing of a starchy secretion, and in the vesicles not being reproduced.

662. *c. c.* The eruption is formed of scattered vesicles like little drops of water, which in three or four days shrivel and dry up. There is no irritation or itching.

The disease is *miliaria.*

663. When the vesicles are unattended by redness they are termed by many *sudamina;* when slightly inflamed, *miliaria.* The eruption occurs in febrile or other disease in which perspirations are present, but it seems to have no effect on the progress of the complaint with which it is associated.

664. *d. d.* The eruption consists of vesicles intermixed with papules, and sometimes with pustules; it is situated where the skin is most thin, and is attended with excessive itching, increased when the body is warm. The *acarus scabiei* or its ova can be discovered.

The disease is *scabies* (*the itch*).

665. As scabies is extremely contagious, whenever you suspect it to be present, ascertain if other members of the same family have been attacked. The parts chiefly affected are the spaces between the fingers, the inner surfaces of the wrists, forearms, thighs, the lower parts of the abdomen, the penis in the male, and the nipples in the female. In children the buttocks and inner sides of the feet are most often attacked. The face and head are scarcely ever affected.

666. The diseases most likely to be confounded with scabies are lichen, prurigo, and eczema. The peculiarity of situation, the evidence of contagion, and the discovery of the acari or their ova, are the most certain means of diagnosis (617). Lichen is distinguished by the essentially papular nature of its rash, by its occurring chiefly on the outside of the back, arms, and thighs, and by the dry rough state of the skin accompanying it. In prurigo the neck and shoulders are more often attacked, and the discovery of pediculi may perhaps be made. Eczema can be often traced to some local irritant, as sugar, lime, &c., and the rash is more simply vesicular than in scabies.

667. *e. e.* A number of small blisters (bullæ) appear upon a reddened surface. The fluid they contain is transparent, or of a yellowish color, and, after being evacuated, a thin crust or superficial ulceration remains. The blisters are often, but not always, attended with pain, heat, or itching.

The disease is *pemphigus.*

668. The chronic form of pemphigus was formerly termed *pompholyx*, but this name is now rarely employed. The blisters seldom attack the scalp, palms of the hands, or soles of the feet. The disease is usually divided into *acute* and *chronic.*

b. The eruption commences with pustules.

669. Under this head you have impetigo, ecthyma, acne, and rupia. Observe if the pustules are pointed and situated on a hard elevated base, if so pass on to (675). If they are blebs, or covered by a thick, conical scab, pass on to (678).

670. *a. a.* There is an eruption of small pustules, only slightly elevated, often in patches; the pus dries

into a greenish-yellow, irregularly-shaped scab or crust. No scar is left after healing. There is generally a sense of heat or itching.

The disease is *impetigo.*

671. By many persons impetigo is considered as a pustular form of eczema. A variety occurs in which the characters of both are present, and which is known by the name of *eczema impetiginodes* (*Porrigo*).

672. *b. b.* The eruption consists of large, round, isolated pustules, situated on a hard inflamed base. The pus dries up into thick brown scabs, which afterwards fall off and leave slight scars. There is often heat, tingling, or itching.

The disease is *ecthyma.*

673. Ecthyma is chiefly met with on the extremities, back, and shoulders. In scabies, ecthymatous pustules are often formed on the hands and feet, but they are associated with vesicles, and acari can be generally discovered.

674. Ecthyma is distinguished from impetigo by the small size of the pustules in the latter, and by their not having a hard base.

675. *c. c.* The eruption consists of little, isolated, hard, conical projections of the skin, some suppurating at their summits, or covered with a scab; others red, hard, and tender. The eruption is confined to the face, neck, and shoulders.

The disease is *acne.*

676. Acne is seldom seen before puberty. It might be confounded with ecthyma, impetigo, and eczema. Ecthyma is known by its broad, flat, not pointed pustules, and is not interspersed with black points, as in acne. In impetigo, the pustules are not hard and

prominent. Eczema is distinguished by its vesicular appearance, itching, or burning, and by its not being confined to the face and shoulders.

677. The varieties of acne are:

A. simplex.—Small black specks surrounded by slight inflammation.

A. indurata.—Hard, red, elevations, with suppurating tops.

A rosacea.—Red patches, often associated with enlarged veins.

678. *d. d.* Flattened blisters are formed, which contain, at first a clear, afterwards a bloody or purulent fluid. Subsequently each is covered with a hard, dark-colored scab, often conical, which conceals a more or less deep, unhealthy ulceration.

The disease is *rupia.*

679. Rupia is almost always a result of syphilis. The lower limbs, loins, and shoulders are most often attacked. It is distinguished from pemphigus by the flattening of the bullæ, the thickened crust, and the subsequent deep ulcerations, instead of the distended blisters, the scaly covering, and superficial ulcers of the former.

680. The chief varieties are:

R. simplex.—Where the crusts are thin.

R. prominens.—Blisters large, crusts thick and prominent, ulcerations deep.

C. The eruption is of a tubercular character.

681. Under this head you have acne (675), molluscum, and lupus. Warts and corns have been already noticed. Keloid, elephantiasis, and frambœsia are generally classed under this head.

682. *a. a.* A number of hard, circular tumors, vary-

ing from the size of a split pea to that of a hazel-nut, are present on the skin. They generally have a black point, or slight depression on their summits, and are sometimes attached by a pedicle to the skin.

The disease is *molluscum.*

683. "(*a.*) Circular tumors, about the size of peas, having a well-marked depression in the centre of each; occurring most commonly on the faces (or other exposed parts) of several children in a family, or on a baby's face and its nurse's breast at the same time (hence the name). This is *molluscum contagiosum.* If one of the little tumors be cut into and squeezed, a lobulated gland-like substance is seen. There is a tendency to spontaneous cure.

"(*b.*) A number of circular tumors of various sizes (from that of a walnut downwards) scattered all over the body and extremities, dotted on their surface with black spots, and giving a semi-fluctuating feeling to the fingers. This is *molluscum fibrosum* or *simplex* or *congenitale*). There is no tendency to spontaneous cure.

"(*c.*) In connection with the last or occurring separately, you meet with tumors of various sizes, consisting of pendulous portions of skin and cellular tissue hanging by longer or shorter slender stalks."[1]

684. *b. b.* The eruption consists of red patches, on which are situated small, round, softish tubercles, which may be covered with a brownish scab, or may have given rise to ulcerations or white puckered scars.

The disease is *lupus.*

685. The disease is most generally met with on the face, and the ulcerations frequently produce great deformity by destroying portions of the nose, &c.

[1] Mr. Tay.

686. The varieties of lupus are:

L. erythematosus.—Irregularly shaped, red patches, with a smooth and glistening surface, ending in scars, but not in ulceration.

L. non-exedens.—Ends in scars, but not in ulceration.

L. exedens.—Gives rise to destructive ulceration and scars.

Section II.

THE SKIN PRESENTS SIMPLY A CHANGE IN COLOR, WITHOUT FEVER OR SIGNS OF INFLAMMATION.

687. Under this head are ephelis (sunburn) and lentigo (freckles), which do not require description; also pityriasis versicolor (639), purpura, and Addison's disease.

688. *a. a.* The eruption consists of a number of spots or patches of a dull red or purple color, which do not disappear under the pressure of the finger.

The disease is *purpura.*

689. The disease is usually attended with great debility, and sometimes proves fatal by hemorrhage from the lungs or into the substance of the brain. It is believed to arise from an abnormal condition of the blood, which becomes extravasated from the vessels of the skin. When the spots are very small they are termed *stigmata;* those the size of flea-bites are known as *petechiæ;* rather larger as *vibices;* and when of considerable area, the patches are named *ecchymoses.*

690. The chief varieties of purpura are—

P. simplex.—Spots small in size, attended by general weakness.

P. hæmorrhagica.—Spots larger. Gums and mucous membranes liable to bleedings.

P. urticans.—Round elevations, like wheals, followed by dark livid spots.

691. The peculiar color of the eruption, and its persistence under pressure, are sufficient to distinguish purpura from all other skin diseases.

692. *b. b.* There are patches of skin of a brownish or olive-green color on different parts of the body. The patient suffers from extreme debility, palpitation, breathlessness on the slightest exertion, loss of appetite, nausea, and occasional vomiting. The lips are pale, and the pulse very feeble.

The disease is *Addison's disease* (*Melasma Addisoni*).

693. In this complaint, first described by Dr. Addison, the suprarenal capsules are diseased. The duskiness of the skin is most marked in those parts which are normally darker than the rest, such as the axillæ, umbilicus, and scrotum, but the face, neck, and upper extremities are also commonly "bronzed;" the lips and inner side of the cheeks often present dark stains. The bronzing seldom occurs when the capsules are affected with cancer. The morbid changes in the suprarenal capsules, which are associated with bronzing, are described by Dr. Wilks as—"first, the deposition of a translucent, softish, homogeneous substance; subsequently, the degeneration of this into a yellowish-white opaque matter; and afterwards a softening into a so-called abscess, or drying up into a chalky mass."

Section III.

THE SCALP, OR OTHER PARTS THICKLY COVERED WITH HAIR, IS THE SEAT OF THE ERUPTION.

694. The hairy parts of the body are liable to the various eruptions that have been before described; thus the scalp is often attacked by psoriasis, pityriasis, eczema, and impetigo. But they are also subject to parasitic affections, which must be carefully studied, on account of their frequency and importance. In every doubtful case the hairs must be examined with the microscope.

695. *a. a.* The part affected presents a number of bright yellow, dry, circular crusts, depressed in the centre, or an irregular mass of dry, sulphur-colored crust. The hairs are dull and dry-looking, are readily pulled out, and, under the microscope, exhibit the *Achorion Schœnleinii.* There is some itching, and a peculiar mouldy smell, like that of mice.

The disease is *tinea favosa* (*favus*).

696. The disease commences as little yellow specks surrounding the roots of the hair; when it has continued for a length of time, patches of baldness are often produced by the destruction of the hair-follicles.

697. There are three varieties of *Tinea favosa:*

Favus pilaris.—When the hair is affected.

F. epidermidis.—When other parts of the skin are attacked.

F. unguium.—When the disease is in the nails.

698. Favus may be confounded with impetigo, but in the latter there are seldom patches of baldness, the

color of the hair is not altered, and the microscope fails to detect the vegetable parasite. Psoriasis may simulate favus, but in it there is no change in the hairs and no mouldy smell, and patches of scaly eruption are usually present on the elbows and knees.

699. *b. b.* There are circular patches on the scalp, upon which the dull, dry hair has been broken off, so as to project only a few lines above the surface, which is covered with fine, white, powdery scales. The hair and scurf, when examined with the microscope, show the *tricophyton* (Fig. 84). There is usually itching at the commencement of the eruption.

The disease is *tinea tonsurans* (*ringworm*).

700. Permanently bald patches may be the result of ringworm, but they are rare. When affecting the scalp it is almost confined to childhood. It may be confounded with eczema impetiginodes, but in the latter the patches are not circular, and the hairs are healthy, the itching is excessive, and eruption of a similar kind may be found on other parts of the body.

701. The varieties of the complaint are:

Tinea tonsurans.—Affecting the scalp.

Tinea circinata (*Herpes circinatus*).—Ringworm of the trunk or extremities.

Tinea sycosis.—Affecting the beard, usually attended with pustules and tubercles.

702. *c. c.* There are round or oval patches of baldness where the hair is quite removed, or replaced by fine, downy hairs. The skin is white, and there is but little itching.

The disease is *alopecia areata* (*Porrigo decalvans*).

703. At first the skin is rather wrinkled and slightly

reddened. The complaint is usually limited to the scalp, but may attack the eyebrows, beard, or genitals. It is believed by many to be the result of a vegetable parasite, but this again is denied by others.

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